Insure VICTORY .... Buy Bonds for War .... Push Plans for Peace

Contractors and Engineers Monthly

Vol. 41, No. 6 JUNE, 1944 $2 a Year, 20 Cents a Copy

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Highlights Of This Issue

- **New 1,452-Foot Bridge**
  A new concrete and steel span carrying the Coastal Highway over the Darien River in Georgia not only provides improved transportation on this much-traveled route now but presages the type of highway modernization which can be anticipated after the war.
  See page 1.

- **Planning Roads of the Future**
  Various aspects of planning for future highway construction and modernization are covered in articles in this issue. These include the use of air maps in highway location and design, a discussion of the growth of the Utah highway system and the plans being made for its future improvement, and a statement of Ohio's road needs.
  See pages 2, 27 and 40.

- **Paving at Airfield**
  The contract for 230,000 square yards of concrete standing area at an Army airfield in California, where unusual weather conditions presented a number of problems to the contractor, is described in this issue, which also contains a pictorial spread depicting scenes on the project.
  See pages 7, 42 and 43.

- **Care of Equipment**
  Continuing our series on "how to keep 'em working", this issue contains a detailed discussion on the care and operation of arc welders, and what to look for in case of trouble; and a description of the program of construction and maintenance-equipment care in Region 5 of the U. S. Forest Service.
  See pages 10 and 24.

- **Highway Maintenance**
  Each month of war places a greater burden on the highway maintenance engineers of the country. How Connecticut is meeting its wartime maintenance problems is described in this issue.
  See page 14.

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Concrete and Steel High-Level Bridge

New Structure on Coastal Highway at Darien, Ga., Provides Needed Facility For Post-War Traffic

By THEODORE REED KENDALL, Editor

(*Photo on page 84*)

✦ DELAYED for nearly six years by litigation and other restrictions, the new four-lane divided-highway bridge at Darien, Ga., on U. S. 17 has recently been completed. With the previously completed South Altamaha River Bridge 3 miles to the south on the same route, it sets the pattern of high-level divided-highway construction for the Coastal Highway between Savannah and Florida, which is in the right-of-way and design stage today for realization immediately after the war. In its entirety it is a project in which the state of Georgia can take great pride.

The old bridge at Darien was a narrow wood-pile-bent affair with a swing span, requiring flagmen and a bridge tender and one-way traffic at all times. It was merely the adaptation of a single-track railroad trestle to highway use as the most economical means of providing a highway crossing of Darien River at the time the old railroad was abandoned. Highway traffic had already reached 3,000 vehicles a day on this through route before the first detour bridge was built at Darien in 1937 to permit the demolition of the old wood bridge before the construction of the new modern bridge could begin. While tourist traffic has fallen off in the past two years, the great increase in bus and military traffic demonstrated the need for a better crossing of the river, and has also placed an excessive burden on the wood-trestle detour bridge built for two years' service, which had already been stretched to six years, and made necessary considerable reconstruction on the temporary wooden structure.

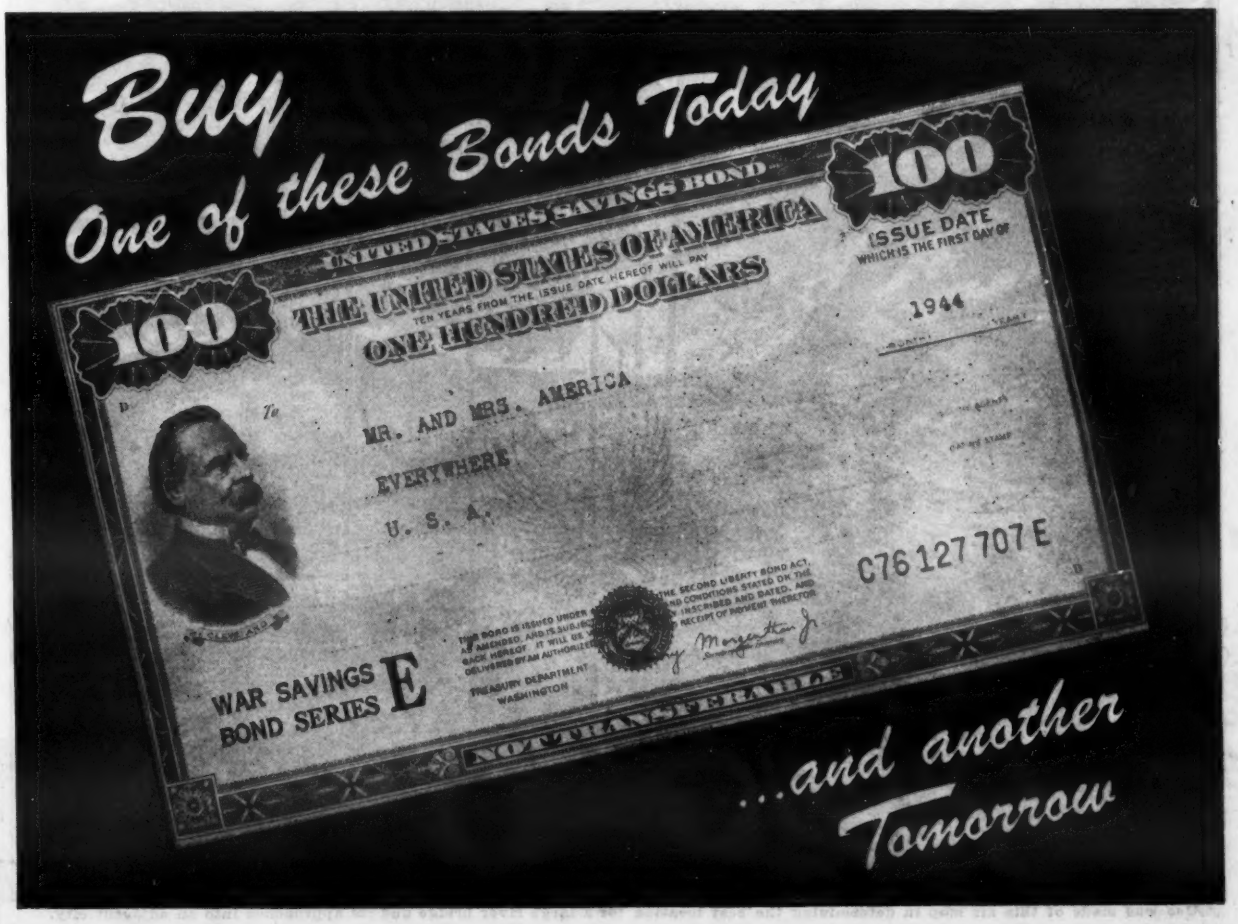
Design of New Bridge

The new bridge is 1,452 feet 6 inches in length and has thirty-one piers, of which five are in Darien River. From the south end there are twenty-one 40-foot and one 40-foot 3-inch concrete-deck and girder spans, then a cantilever suspended span of structural steel with 91, 150 and 91 feet between the pier centers. Following this, proceeding north, there is an 80-foot plate girder, one 40-foot 3-inch and three 40-foot concrete-deck and girder spans. The entire structure is designed for an H-20 loading.

On the steel-girder spans there are three girders, the middle one of which divides the deck into two 22-foot roadways. There is a 4-foot sidewalk on both sides. The 3-foot strip dividing the highways consists of the girder and two concrete curbs. In the reinforced-concrete spans there are five girders per 22 feet of roadway, each 1 foot 3 inches wide and 3 feet 3 inches deep, more or less, according to the crown of the 7-inch concrete deck.

A novel feature of the design of the

(*Continued on page 12*)



Planning with Air Maps

Air Surveys Aid Selection Of New Highway Routes and Speed Work of Location, Design and Development

By A. R. NICHOLS, Consulting Landscape Architect, Minnesota Department of Highways, and Chairman, Committee on Roadside Design, Highway Research Board

✦ PLANS for post-war development involve housing, industry, recreation, transportation, and other phases of human life and progress. A master plan for the city, town or region will include provisions for every type of needed development, each in well-planned relation to the other. All parts of the integrated pattern drawn on the master plan will be connected by a network of planned highways, streets, and parkways. No one part of this master plan of a city or of a highway can be considered alone. Highway design has as its objective the development of the highway as a complete unit planned as a part of the country landscape or of the urban improvement.

Highway Location

There are many factors which control the location and design of every highway. These include the character, density and speed of traffic; topography; soil character; local industry; land use; etc. Of these factors, topography is one of the most important. The form of the surface of the land, the location of rivers, and the top of ridges, the location of urban features such as industrial plants, freight depots, airfields, etc., are all interdependent factors to which highways must be fitted. Aerial photography and aerial surveys have more and more become a valuable aid in studies for the design and location of the complete highway.

The development of the science of photogrammetry has made it possible to obtain extremely accurate topographic maps from air surveys. Army Air Forces are developing new photographic and mapping equipment which has already rendered obsolete ground preliminary survey and reconnaissance methods of a decade ago. In a few days of clear weather, a whole highway route over a strip a half mile or more wide and some ten miles long can be pictured. The results obtained are comparable in many respects to a ground contour survey requiring weeks or months by crews of transit or plane-table men. The Army has spared neither man-power nor expense in the refinement and perfection of its new equipment. Highway engineers making reconnaissance and development studies will have access to this new equipment immediately following the end of hostilities.

Advantages of Air Maps

Even the old uncompensated mosaic air maps of the 1930's had the following advantages:

1. To the Highway Administrator with his limited time for technical details, air surveys reveal the broad picture of the area involved and give him cognizance of the problem as a whole without the necessity of consideration of details.

2. To the Construction Engineer, a more thorough investigation of location is possible by means of aerial surveys. The physical conditions are revealed sufficiently to enable him to study the general lines desired to serve the traffic direction with minimum costs.

3. To the Location and Design Engineer, air maps provide an actual foundation picture on which may be drawn to scale the general alignment of the proposed highway. It also makes possible the sketching of an alternate route and the making of reasonable cost comparisons.

4. To the Landscape Engineer, aerial surveys reveal not only existing timber along the proposed line, but also permit a preliminary basis of design taking the

(*Concluded on page* 23)

The Application of an Air Survey to a Project Where A Navigable Stream Had To Be Crossed Within a City

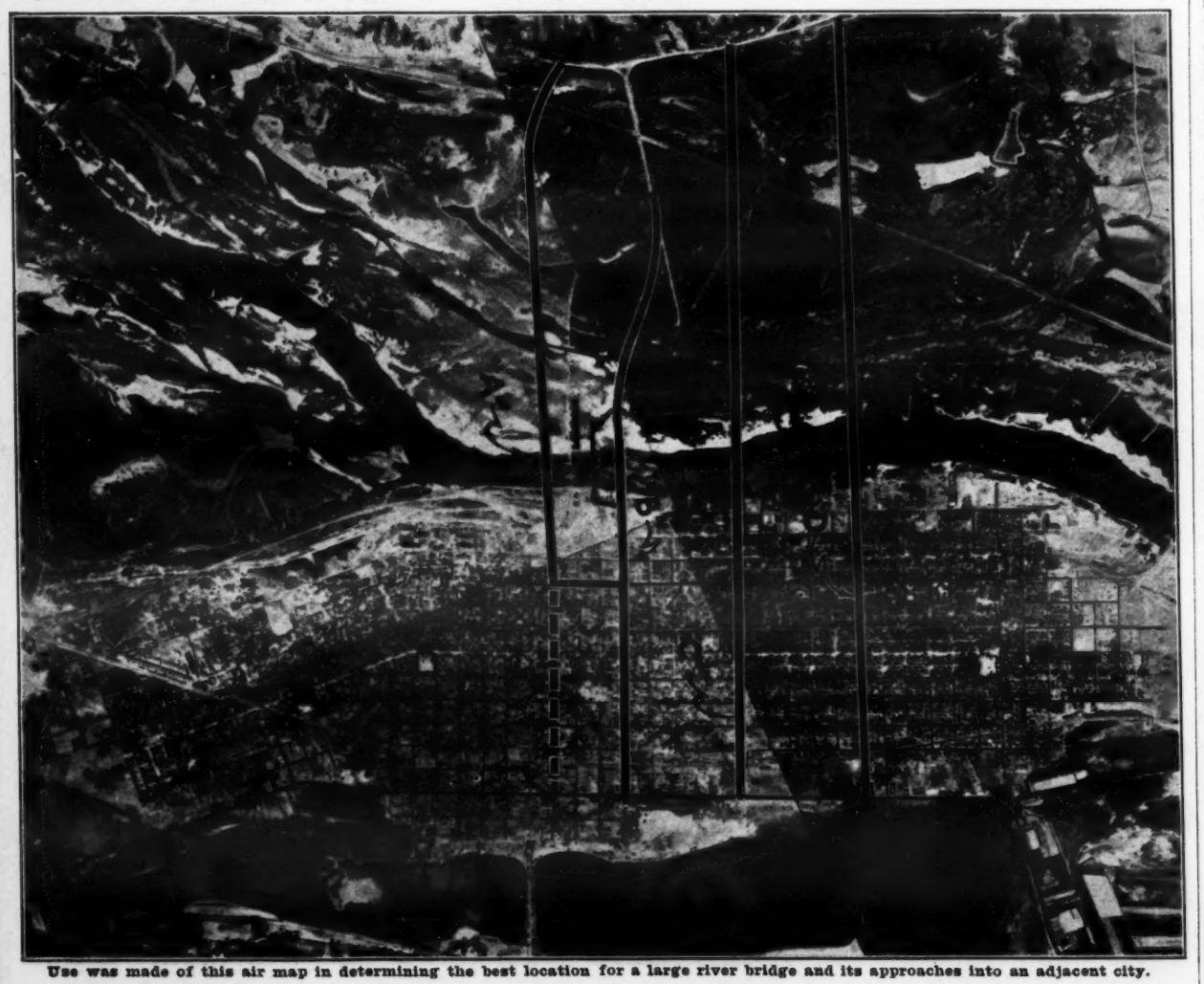
By WALTER SCHULTZ, Assistant Engineer of Plans and Surveys, Minnesota Department of Highways

✦ TO study a particular problem, the highway planner usually begins by collecting all available maps of the area involved, which he believes will be of use to him. These may include maps of county, city, special improvement district, topography, sewer, water, insurance, traffic flow, etc., but regardless of the number and variety, the chances are that he will still find many uses for an aerial photographic map. These are especially valuable in the planning of street and highway facilities in metropolitan areas. This particular field of highway transportation now assumes more importance as thought and energy are directed to preparing plans for post-war construction.

The growing realization that our cities are so badly out of gear with automotive transportation has presented to city and highway planners the broad problem of planned city development. In this automotive age, the master plan for street and highway facilities must form the framework for redevelopment of the city. Such plans require public support. Having the advantage or quality of pictorial illustration, the air map is a particularly valuable aid in showing how proposed physical improvements will relate to adjacent areas.

The development of practical plans which adequately solve the street and highway transportation problems of metropolitan areas will, generally speaking, be quite an accomplishment in itself. Yet these plans will be ineffective unless a successful job is done in winning public support for them. That is a matter of informing interested citizens about the

(*Continued on page* 70)



Use was made of this air map in determining the best location for a large river bridge and its approaches into an adjacent city.

DOING DOUBLE DUTY

Marine Corps Photo from Acme

The dragline bucket on an excavator serving with the U. S. Marines on New Britain in the South Pacific provides the comforts of home (or at least a shower) for a Marine lieutenant.

A Road-Mix Surface On Old Treatments

Section of U. S. 11 South Of Eutaw, Ala., Resurfaced Using Local Bar-Run River Gravel and MC-3 Asphalt

✦ THE highway between Eutaw and Livingston, Ala., U. S. 11, has always been subjected to traffic amounting to an average of 1,000 vehicles per day from Birmingham and the north going toward Meridian, Miss., and New Orleans. The section of road discussed has a 16-inch foundation of sand-clay placed over the A-7 plastic subgrade prior to 1937, when a double bituminous surface treatment of slag between 1¼ and ½-inch screen size was applied with a hot-seal. This section of road was sealed with 50 pounds of plant-mix per square yard in 1942.

Continued heavy war traffic required further strengthening of the surface to distribute the loads, so a state project was set up in 1943 for 10 miles of road-mix resurfacing to be done by state maintenance forces from Division 3 at Tuscaloosa, Ala.

Preparation of Roadway

The 20-foot roadway was thoroughly cleaned of all loose material by a rotary broom and then shot with 0.2 gallon of MC-3 per square yard as a tack coat and to seal all cracks in the existing surface. The roadway was shot full width and then blotted immediately with bar-run sand-gravel to permit traffic to continue uninterrupted. The tack coat was applied by a Kinney 500-gallon distributor.

Just before the shooting of the tack coat, the distributor was run down the sides, and the edge of the old pavement for a width of 2 feet was shot with the same hot asphalt so that the edges thus received a double seal of asphalt. This application provides an excellent protection against water having a tendency to seep into the base course along the edges, due to temporary pondage from high places occurring on the shoulders. It also keeps the edges alive and helps to prevent raveling in case the shoulders become too low.

The Gravel Pit

Located at about 10 miles from the mid-point of the project is an excellent bar of well-graded sand-gravel at a place where the Tombigbee River widens, facilitating its deposition. This bar has

(*Concluded on page* 26)

Distributors apply Texaco Asphalt Cement in the construction of a Penetration Macadam pavement.

Paving a city street with heavy-duty Texaco Sheet Asphalt.

Road-mix construction, using Texaco Cutback Asphalt and local aggregate.

Have your Post-war Street and Highway Projects planned and ready to go!

Texaco Slow-curing Asphaltic Oil and aggregate being mixed by traveling plant.

Laying plant-mixed Texaco Sheet Asphalt pavement on worn concrete highway.

A surface-treatment with Texaco Cutback Asphalt provides a tough, waterproof mat.

Every street and highway official is doing all in his power to help win the war. But these officials have an added responsibility—the necessity of planning road and street projects now to provide immediate, useful employment when the war ends.

For example, now is the time to decide which of the various types of Texaco Asphalt construction supplies the most satisfactory, economical answer to your post-war street or highway problem. Texaco Engineers, who are Asphalt specialists, have both the experience and the willingness to help you with this problem. Write to our nearest office, letting us know how we can be of service to you

THE TEXAS COMPANY, *Asphalt Sales Dept.*, 135 East 42nd St., New York City (17)

Boston (16) Chicago (4) Denver (1) Houston (1) Jacksonville (2) Philadelphia (2) Richmond (19)

TEXACO ASPHALT

Contractors and Engineers Monthly

THE NATIONAL BUSINESS PAPER FOR CIVIL ENGINEERING CONTRACTORS AND HIGHWAY ENGINEERS AND COMMISSIONERS

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Theodore Reed Kendall, Editor
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Edgar J. Buttenheim, President — Donald V. Buttenheim, General Manager
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Financial Aid Should Work Both Ways

A spokesman for one of the Public Lands states in the great Western Empire of the United States recently said that approximately two-thirds of his state is owned by the Federal government in various types of reservations, national parks, and monuments. Because of this, he feels that the Federal government should pay the entire cost of all highway construction through these publicly owned lands.

Although these highways do serve the taxpayers of that state primarily, they are used by interstate tourists, and the state cannot be expected to pay the entire cost, even with Federal Aid, of this highway construction through Federally owned land. But, will that state be willing to return to the Federal government, and therefore to the people of the nation, the amount of the gas tax which it collects from the owners of vehicles driving over these highways financed entirely by Federal funds?

A Gift of War to Peace

Through the din of political harangue, of boasted post-war plans, and accusations and recriminations over waste in wartime construction comes a note of realization that many useful post-war services will be rendered by not a few of the war-built industrial plants which were created to meet shortages of war matériel.

Two outstanding examples of conservation to result from wartime expedients have recently been mentioned in the newspapers. Both have to do with alcohol production from plant growth but in widely divergent fields. The one is producing alcohol from grain for manifold industrial uses, while the other uses sawmill wastes to the same end.

Since there are already more than 700 uses for alcohol and its derivatives—these include the manufacture of plastics, medicines, dyes and aviation fuel, to name but a few—it is easy to understand the post-war value of such processes, commercially established as a result of war needs, which will increase the available product for the era of peace.

In February, the world's largest single-unit grain alcohol plant was dedicated in Omaha, setting up near the farms an industry which will utilize the great chemical properties of grains and other crops. In an editorial, the *New York Sun* stated, "Built at a cost of $5,000,000, this plant is designed to produce 17,500,000 gallons of alcohol a year which, during the war, the Defense Supplies Corp. will allocate to the manufacture of synthetic rubber, explosives and other munitions. Operating at capacity, it can utilize 20,000 bushels of grain daily, of which 45 per cent will be corn, 45 per cent wheat and 10 per cent barley malt. As by-products, it will turn out 18 pounds of highly concentrated stock feed from each bushel of grain; yield annually 5,000,000 pounds of corn oil, valuable in seasoning food for the human palate; and, in an annex yet to be built, manufacture 120 tons of dry ice daily by crystallizing carbon-dioxide gas drawn from fermenting grain."

The second plant, actual construction of which awaits the approval of the War Production Board, is designed to process 200 tons of sawmill wastes daily, to produce 4,300,000 gallons of alcohol a year utilizing a method long in operation in Germany, the patents for which are now held by the Alien Property Custodian. This government-owned wood-sugar and ethyl alcohol plant to be built at Springfield, Ore., will cost about $2,500,000. Its success would point the way to large-scale utilization of sawmill wastes, long the bane of operators.

These plans follow thorough pilot plants tests, conducted last year at Marquette, Mich., by the U. S. Forest Products Laboratory at the request of the Office of Production Research and Development. While a national potential of more than 1,000,000,000 gallons of alcohol a year from 20,000,000 to 30,000,000 tons of mill wastes may not be within economic reach at present, preliminary surveys, according to American Forest Products Industries, Inc., indicate 150,000,000 gallons could be in production within less than a year, assuming approval of plants. The ideal location of such a plant is adjacent to one-half its required raw material, with the rest available within a radius of about 30 miles. Softwoods, in the West and the South, offer best possibilities.

Here we have an answer to the problem of reemployment of many war workers and fighters in new industries where technological developments in the industries they left may reduce the need for their reemployment. American chemistry and engineering through new processes and new construction hold the key to success in post-war industrial developments.

Savings by the country's wage earners have been increased tremendously by the Treasury's Payroll Savings Plan of buying War Bonds. This is not only a vital contribution to America's war effort, but can exert a powerful influence in the nation's post-war welfare. If your employees are not now signed up for the Payroll Savings Plan, urge them to do so at once, or if possible to increase their purchases under this plan. Dollars invested in War Bonds today will prove a constructive factor in American economic life in the future.

Idle Machines Must Be Put Back to Work

The Construction Machinery Division of the War Production Board calls the attention of all owners of cranes and shovels, motor graders, crawler tractors and allied equipment to the serious shortage of this type of equipment, due to the fact that the military program is taking most of the new machines produced. In spite of the fact that the heavy construction equipment industry is producing at a rate nearly four times greater than in pre-war years, the demand for new machines far exceeds production.

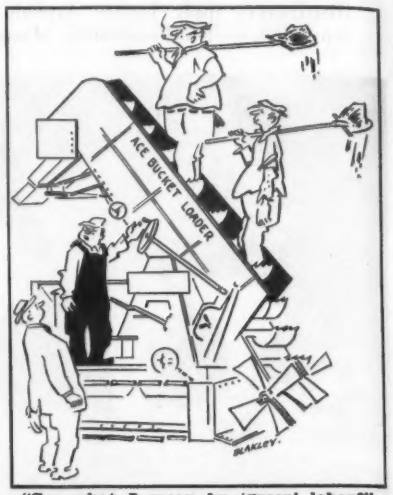
The only solution to this problem is the substitution of used equipment for vital war work because new machines are not available. Owners of idle cranes and shovels, tractors, and motor graders can make a real contribution to the war effort by registering such equipment with the regional offices of the WPB, so that these idle machines may be put to work at once. They are desperately needed in strip mining, logging, oil-field and pipe-line work, and in all phases of agricultural production.

Reluctance in selling used equipment should be overcome, it is pointed out, by a full understanding of the tax relief provisions applicable to profits from the sale of used machinery. These provisions, under specified conditions, cover both voluntary sales and sales made under the "threat of imminence of requisition" by a government agency having the power to requisition.

For example, if you own construction machinery and if a government agency having the power to requisition threatens to requisition that machinery, and if you thereafter sell that machinery to the agency, the proceeds of the sale may be put in a replacement fund and no Federal income taxes need be paid on the gain realized from the sale.

Special provisions are also made for voluntary sales of such equipment, with certain alternative arrangements, so that the most an individual will be required to pay in Federal income taxes on the total gain from the sale of such machinery is 25 per cent of the gain. All this is fully covered by Section 117(j) and related sections of the Internal Revenue Code, as amended in 1942, and the Regulations of the Internal Revenue Bureau. You are urged to contact your local Internal Revenue Officer regarding this tax subject.

Construction machinery was built to do a job, and it has done a good job. As of March 1, 1944, the inventory of used construction equipment owned by contractors and distributors was listed as 22,615 crawler tractors, 4,788 motor graders, and 16,444 cranes and shovels. While it is recognized that most of these machines are busy on essential war work, many of them are not. Don't let one of those machines stand idly by, when its services are so urgently needed to move on to Victory.



"See what I mean by 'green' labor?"

Pan American Highway Congress Meets in July

Organization of a permanent administrative association to carry out its decisions will be considered at the Fifth Pan American Highway Congress, scheduled to be held in Lima, Peru, from July 15 to 25, according to a recent announcement from the Office of the Coordinator of Inter-American Affairs. The aggenda also includes discussion of such varied subjects as transit, legislation, administration, propaganda, and international affairs and post-war problems. Construction of underground fuel tanks along the Pan American Highway and the necessity of altering highway pavement and bridge structures to facilitate heavy cargo and military traffic will be considered.

The Peruvian Foreign Ministry has invited the governments of the American republics and the Dominion of Canada to send representatives to the Congress. This is the first time that Canada has been invited to a Pan American Highway Congress.

U. S. OFFICIALS INSPECT INTER-AMERICAN ROUTE

Federal Works Agency Photo

On an official inspection tour of the 3,356-mile Inter-American Highway from Laredo, Texas, to the Panama Canal are (left to right) Ralph E. Mills, contractor; E. W. James, Chief, Inter-American Regional Office, Public Roads Administration; Major General Philip B. Fleming, Administrator, Federal Works Agency; Thomas H. MacDonald, Commissioner, Public Roads Administration; and Marvin L. Harschberger, Public Roads Administration engineer in Costa Rica.

PORTAGE COUNTY *Pioneered* WITH SEAMAN,—AND THAT FIRST PULVI-MIXER *Is Still Faithfully Serving* TODAY!

We're going to let the words of Mr. Perry Worden, Highway Commissioner of Portage County, Wisconsin, tell the story:

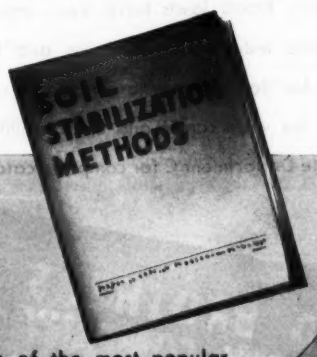
"The Portage County Highway Commission bought its first Seaman Pulvi-Mixer even before the start of my administration as Highway Commissioner. That Seaman Mixer was the first one in the country specifically used for highway construction and we're rather proud of the fact that Portage County pioneered with Seaman.

We've used the Seaman Mixer year in and year out ever since. In black top work, we operate the Seaman on the windrow between two motor graders, and the in-place mixing time has been so sharply reduced that the graders have many more hours available for maintenance and repair of other roads. Not only that, — but we get a better and more uniform mix, with a consequent saving in oil. 'Lean' and 'rich' spots have been eliminated and 'bleeding' with its consequent traffic hazard is unknown.

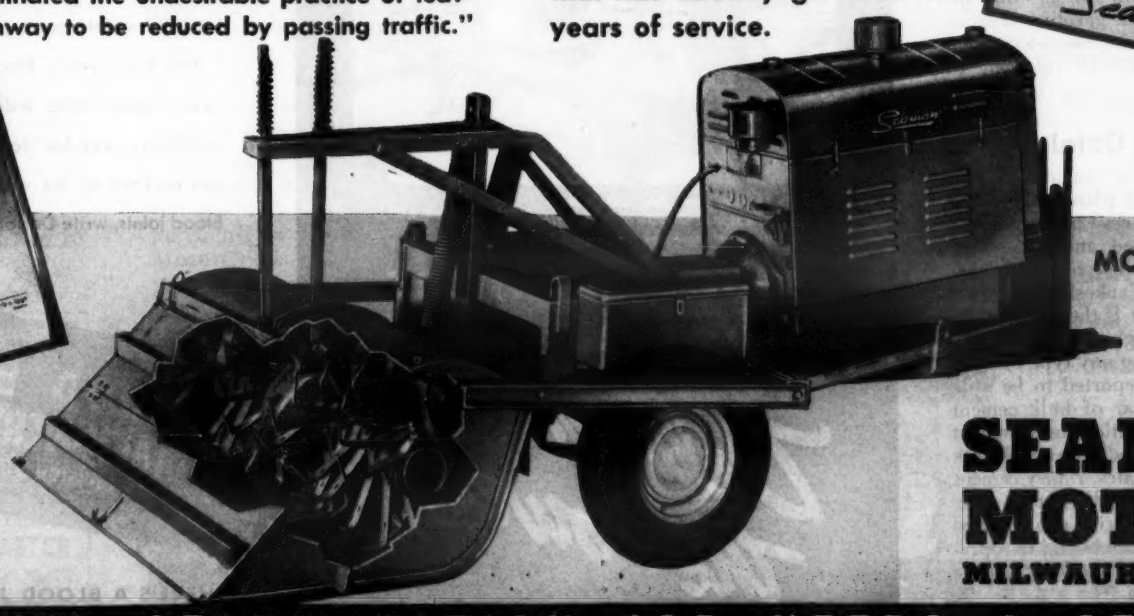
Another important use for the Seaman Mixer, — and one which I believe originated in Portage County, — is in shoulder maintenance and ditch clearing. We send the Seaman in after our motor graders have stripped the sod and brush, to pulverize the lumps and reduce the material so that it can be spread. This has eliminated the undesirable practice of leaving clods on the highway to be reduced by passing traffic."

A snapshot of the original Seaman Pulvi-Mixer (tractor-operated) — the first unit ever used in highway construction, working on a Portage County (Wis.) highway, pulverizing scarified black top prior to remixing.

. . . Today, Portage County has another Pulvi-Mixer at work in conjunction with the "old timer" that has already given so many years of service.



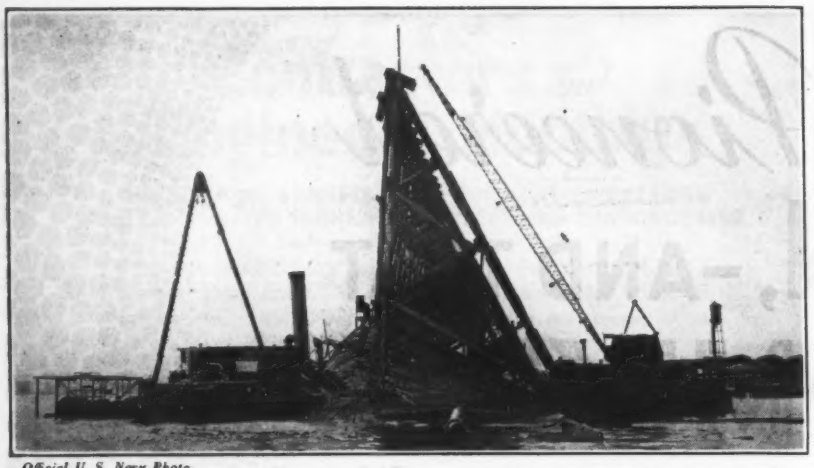
One of the most popular handbooks in the highway field, the 1944 edition of "Soil Stabilization Methods", compiled by Seaman Engineers, is ready. Ask for Bulletin E-24.



MODEL MHD-72

SEAMAN MOTORS
MILWAUKEE, WIS.

"EVERY SOIL STABILIZATION JOB NEEDS A SEAMAN"



Official U. S. Navy Photo

An end view of the giant timber frames used in righting the battleship U. S. S. Oklahoma, sunk during the Jap attack on Pearl Harbor. Cables rigged across these frames were attached to the ship and, when drawn taut by G-E-motor-driven winches on shore, gradually pulled the hull into upright position. Later the cables held the ship in position during the salvage operations.

Injection Principle For Gasoline Engines

Gasoline injection, a radically new method of supplying fuel to the cylinders of gasoline engines, has been perfected and is now in production, according to a recent announcement by American Bosch Corp., 3664 Main St., Springfield 7, Mass. This method of fuel delivery has been adapted from the diesel engine, in which fuel is delivered to the cylinders in much the same way. American Bosch has manufactured diesel fuel-injection equipment for a number of years, and drew heavily on this experience, as well as on its experience in the production of ignition systems for automotive and aviation engines, in the development of gasoline injection.

The company states that, by this system, gasoline is delivered uniformly to every cylinder of the engine, with the result that all cylinders "pull" together in harmony, producing a smoother flow of power and quieter engine operation. It is further stated that an engine equipped with gasoline injection responds instantly to the touch of the throttle, the time lag is eliminated, acceleration is smoother, and there are no backfires, because the fuel, either in fuel or vaporized form, is confined within the engine cylinders. The air induction system carries air only, which is not mixed with the fuel until it reaches the cylinders.

"The dwindling oil resources of the nation lend special significance to the development of gasoline injection," said Donald P. Hess, President of American Bosch. "By the use of this system, all fuels, even lower grades, burn more completely and efficiently. Thus a greater proportion of their potential power is delivered in the form of useful energy. Miles per gallon increase; cost per mile decreases."

Further information on gasoline injection equipment for gasoline engines may be secured by those interested direct from the manufacturer by referring to this item.

Butler Bin Catalog

Concrete plants of various types, portable bulk cement plants, sand and gravel plants, hoppers and weighing batchers are described and illustrated in Bulletin No. 260 just received from the Butler Bin Co., Waukesha, Wis. One feature of the catalog is the Butler Carscoop, a compact, highly maneuverable machine for unloading any type of bulk materials, which is reported to be able to unload a 56-ton car of bulk cement in 75 minutes. The Butler Agra-Cement Batcher, also illustrated, equipped with clamshell aggregate gates, rotary cement filling valve, wringer discharge gate, exclusive twist-of-the-wrist control and a compact all-steel scale, is said to represent a great advance in modern batcher design.

Copies of Bulletin 260 may be obtained upon application to the manufacturer. Just refer to this item.

Plans for Kentucky Roadside Work in '44

During 1944, the work of the Roadside Improvement Supervisors of the Kentucky Department of Highways and the laborers under their direction will be devoted primarily to seeding and sodding to prevent erosion along the roadsides, with such trimming of trees as is necessary to provide clear vision to the traveling public. During the spring, 55,500 pounds of Lespedeza seed was planted, as it has been Kentucky's experience that Lespedeza provides a better cover on poor soil of cut and fill slopes than any other seed used by the Department. Where the soil and surface of the ground justifies it, bluegrass and clover are planted.

The roadside parks are being kept in order, all the roadside tables were carried in to the Department of Highways garages, cleaned and either varnished or painted, and were replaced along the roadsides in April. Wood was cut and placed where there are outdoor grills. This work on the tables and cutting the wood is done when the weather does not permit working outdoors.

B. F. Buckner, Engineer of Roadside Improvement, and his associates are also working on post-war roadside development plans, many of which have already been completed, and many others of which are still to be made.

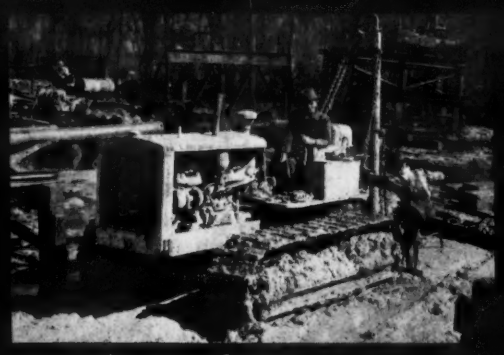
Long Named Branch Mgr. For H. O. Penn Machy. Co.

Announcement has been made of the appointment of Russell W. Long as Manager of the Mineola, L. I., branch office and service shops of the H. O. Penn Machinery Co., New York distributor of construction equipment. For the past seven years Mr. Long has served as a Penn sales representative, concentrating on the New Jersey territory. In taking the position in Mineola, he will fill the vacancy left by Jack Frost, who recently purchased the controlling interest in the Michigan Tractor & Machinery Co. of Detroit and Grand Rapids, Mich.

Arizona Sand...

"Caterpillar" Diesel Tractor levelling landing field in dust and heat of Arizona desert.

or Louisiana Mud...



Deep in Louisiana mud, this "Caterpillar" Diesel Tractor is used to move oil well rigs, set up derricks and other jobs.

BLOOD BROTHERS UNIVERSAL JOINTS

Deliver the Power!

In buying construction and maintenance equipment, look for

BLOOD BROTHERS

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THERE'S A BLOOD JOINT FOR EVERY NEED OF POWER THROUGH ANGULARITY

Concrete Paving At Desert Airfield

Design Modification Allows Work to Progress Rapidly Despite Unusual Rainfall; Water Heated at Supply Line

By FRANK B. SARLES,
Field Editor

(*Photos on pages 42 and 43*)

✦ WHEN construction of additional hard-standing are was deemed advisable at the Army's Muroc, Calif., Airfield in December, 1943, a contract was awarded by the U. S. Engineers to Bressi & Bevanda and United Concrete Pipe Co. of Los Angeles for the immediate construction of 230,000 square yards of concrete pavement. Despite unusually heavy rainfall, not ordinarily to be anticipated in the locality, the work progressed rapidly and was completed prior to the expiration of the contract period.

The site of the improvement, close to an operating airfield, was on an area which had been previously graded and given a dust palliative treatment, so no heavy grading operations were contemplated when the contract was awarded. Construction of a disintegrated-granite base, in strips of 25 feet wide spaced at 100-foot intervals, was planned only under the locations of the longitudinal expansion joints, since the existing subgrade was considered to be stable enough to carry the pavement without additional treatment.

Immediately after construction had been started, however, an unusually heavy rainfall of 2¾ inches occurred during a period of three days. Since the annual rainfall in this locality is less than 6 inches, this concentrated precipitation so softened the entire area that it was considered essential to the immediate completion of the project to revise the design. It was accordingly decided to excavate the muddy subgrade material from the entire area to be paved and replace it with a 6-inch compacted base of disintegrated granite. This material was available at a location about 7 miles distant and two 2-cubic-yard Northwest shovels were moved to the location to load the disintegrated granite, after it had been lightly blasted, into trucks of varying kinds from 6 to 10-cubic-yard capacity. Using an average of 65 such trucks, the contractor was able to maintain an average production of 5,000 cubic yards per day of 20 actual operating hours.

Excavation in preparation for the base material was done by six Tournapulls and three 14-cubic-yard LeTourneau scrapers pulled by Caterpillar RD8 tractors. Six RD8's with LeTourneau bulldozers and pulling sheepsfoot rollers compacted the fills and subgrade. Three additional RD8 tractors with LeTourneau bulldozers and sheepsfoot rollers spread and compacted the granite base to a California bearing ratio of 95 per cent, and two Caterpillar power graders maintained the proper surface while final rolling was being done by a Galion 10-ton gasoline roller.

Aggregates and Batching Plant

Coarse aggregate was shipped from the Irwindale plant of the Consolidated Rock Co., and unloaded to stockpiles and bins by a Northwest crane with a 60-foot boom and a McCaffrey Rud-o-Matic tagline for the clamshell bucket. Sand was hauled by truck from the Peter L. Ferry plant at Little Rock, Calif., while cement was hauled in both tank trucks and 1,800-pound bags on flat trucks from the Monolith plant of the Monolith Portland Cement Co., and batched through a Western Pipe & Steel Co. and a Blaw-Knox bulk-cement plant. Two portable steel overhead cranes furnished by the cement manufacturer were used to transfer the large bags of cement from trucks to the bulk-cement plant, while the tank cement trucks discharged their loads from a drive-up ramp into the delivery bins.

U. S. Engineer Photo

Excess material from the fine grade was removed by a LeTourneau Carryall scraper pulled by a Caterpillar tractor.

A Blaw-Knox and a Butler bin, each of 200-cubic-yard capacity and having four compartments, three of which were used for rock, were erected several hundred feet apart at the plant site, and loaded by a Northwest crane with a 60-foot boom and Kiesler 2-cubic-yard clamshell and another Northwest crane with a 70-foot boom and a 1¾-cubic-yard Blaw-Knox bucket. Both aggregate batching bins were equipped with Blaw-Knox scales, while Hardy scales were used on the bulk-cement plants. An

(*Continued on page 20*)

80, 115 and 165 gallon sizes on skids and on steel wheels. Send for FREE Bulletin No. 194PC (specifications, prices, etc.)

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USING 4 Moto-Cranes to raise thirty-one 200 ft. wood roof trusses on the new Ryan Aeronautical Final Assembly Building in San Diego, is a liftable idea submitted by R. E. Hazard & Sons, owners of 12 Lorains.

This job was not so much a matter of weight as one of mobility and accurate boom control. Equal distribution of the load had to be maintained to avoid any distortion or mistreatment of the arches while maneuvering each truss into the heel plate positions—an unusual operation, yet typical of the hundreds of varied jobs Moto-Cranes are performing daily.

Completely mechanized, Moto-Cranes are mounted on 10 rubber tires that cushion as well as speed their travel between jobs—are sure-footed and steady on off-the-road jobs, crawl along at a snail's pace or speed up to 35 M.P.H., and jockey into working position as easily as parking your car.

If mobility and maneuverability are essential on your material handling operations, you'll find it mighty profitable to apply Moto-Crane performance on your postwar jobs. See your Lorain distributor for details.

THE THEW SHOVEL COMPANY
LORAIN, OHIO

Ryan Aeronautical Company Photo

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One of the new fabricated Heil bulldozers mounted on a Cletrac.

New Line of 'Dozers For Use with Cletracs

Once again necessity has been the "mother of invention". When it became almost impossible to get steel castings for its line of bulldozers, the Heil Co., in conjunction with the Cleveland Tractor Co., set out to design a line of 'dozers which would eliminate castings wherever possible. The result of their work is a completely fabricated unit which incorporates all the latest developments in hydraulic bulldozer design.

By prefabricating the mounting members of moldboard parts, it has been possible to reduce the "over-hang" weight on the Model FD bulldozer more than 2,000 pounds. The blade is 11 inches nearer the tractor and, by changes in the linkage, the blade action has been speeded up to that of a cable-operated blade. The lift of the blade has been increased about 50 per cent, making the total lift of the Model FD blade 52 inches.

These new fabricated bulldozers and trailbuilders are now available on all models of Cletrac tractors, making a complete line of modern streamlined units from 30 to 100 hp. Complete information may be secured from either the Cleveland Tractor Co., Cleveland 17, Ohio, or the Heil Co., Milwaukee 1, Wis.

U. S. Rubber Appointment

Ernest G. Brown has been named General Manager of the mechanical goods, general products and Lastex yarn and rubber thread divisions of the United States Rubber Co., succeeding Willard H. Cobb, recently elected Vice President and member of the Executive Committee. Mr. Brown has been with the company since 1929, having served as production manager for six of its plants and, since 1942, as General Manager of the munitions division.

Industry Is Prepared For Highway Program

Serving as witnesses for the American Road Builders' Association at the hearings on the new Federal-Aid bill before the House Roads Committee were W. A. Roberts, Vice President, Allis-Chalmers Mfg. Co.; H. O. Penn, President, H. O. Penn Machinery Co.; and Frederick Hoitt, Executive Secretary, New England Road Builders' Association, all of whom testified to the ability of the highway industry to meet the requirements of a highway-construction program of the size contemplated.

Mr. Roberts assured the committee that there would be little difficulty in meeting post-war demands for new machinery, inasmuch as construction equipment manufacturers are not faced with any serious reconversion problems. In most cases, they can turn their products directly to civilian use immediately upon relaxation of military demands. In addition, he said, the capacity of the industry has been greatly expanded and today the maximum output is three to ten times the pre-war level of 1939. On an average, its total capacity is three and a half times that of 1939.

Supplementing Mr. Roberts' statement, Mr. Penn pointed out that there is a vast inventory of used equipment, approximating 332,000 items, in the hands of private contractors and governmental agencies, which would be more than ample to get a highway program under way, although there would also be a substantial need for new equipment later.

Citing figures obtained from a recent nation-wide survey made by the American Road Builders' Association, Mr. Hoitt stressed the fact that there will be more than enough qualified contractor organizations available after the war to take care of the highway program set forth in the pending bill. Many contractors have greatly expanded their organizations during the war, and will be able to undertake work considerably in excess of their pre-war levels, he said.

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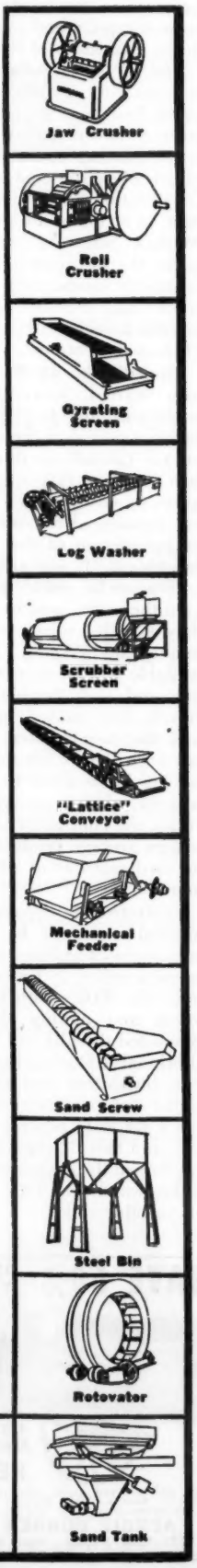
Channel Frame Return Conveyor
4' x 8' 3-deck Gyrating Screen
36" x 8' Apron Feeder
20" x 36" Jaw Crusher
40" x 24" Roll Crusher
Lattice Frame Conveyor

Over 100 tons per hour, 1,000 tons per day—day after day—of ballast, mostly 1½" and 1", are being turned out at minimum cost for the Burlington Railroad at Wyalusing, Wisc. This plant, one of a number owned by E. C. Schroeder of McGregor, Iowa, consists of 6 standard units selected as most suitable for this railside quarry. Timber was used wherever possible to conserve metal. Output is up to the expectations of all concerned.

This plant, made up of 6 "packaged" units and arranged to provide a minimum of handling, includes: a 20" x 36" roller bearing primary jaw crusher of Universal's exclusive light-strong Streamlined design; a 40" x 24" roller bearing star gear roll crusher for secondary reduction; 4' x 8' three deck gyrating screen; a 36" x 8' apron feeder with bar grizzly and by-pass (to by-pass fines around primary crusher); a 24" x 108' lattice frame conveyor from primary crusher to screen; and an 18" x 44' channel frame return conveyor. This is another case where soundly engineered standard units of the proper size selected from Universal's complete line were brought together to form an efficient, profitable plant. Probably we can do the same for you.



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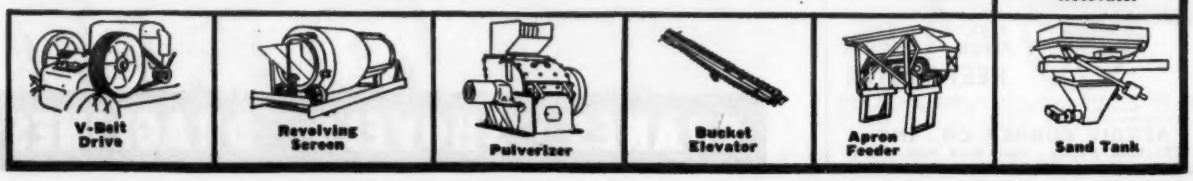

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Mobile County, Ala., Has Growing Pains

With Two Great Shipyards And An Important Airfield, Population Growth Taxes County Road Facilities

✦ THE Gulf Shipbuilding Corp. at Chickasaw, a northern suburb of Mobile, Ala., and the Gulf Dry Dock & Shipbuilding Co. on Pinto Island in Mobile Bay, plus the completion of Brookley Field as a southeastern air center, created serious population and traffic disturbances in Mobile County which have their repercussions in the intensified problems of the County Highway Department. The increases in population between the 1940 census and the summer of 1943, based on ration-book registrations, are, according to figures furnished by the Chamber of Commerce: City of Mobile, 78,720 and 135,000; Mobile metropolitan area, 114,906 and 230,000; Mobile County, 141,000 and 265,000.

The movement of 6,000 to 8,000 vehicles at each change of shifts at the Gulf Shipbuilding Corp. at Chickasaw has been taken care of by the reconstruction of Telegraph Road, an 18-foot concrete road, by the State Highway Department (see C. & E. M., May, 1944, page 1), and by the rebuilding of Wilson Avenue, which intersects Kraft Highway and Telegraph Road at Chickasaw. The county secured right-of-way for the Wilson Avenue project, the State Highway Department furnished engineering supervision, and WPA furnished men and materials. Part of the route was an existing street and the balance, new section formerly used as a street-car right-of-way. The pavement is 44 feet wide, of double bituminous surface treatment, using tar and slag aggregate on an 8-inch compacted sand-clay base. WPA contracted with S. R. Batson, of Birmingham, Ala., to haul the base material and with Southeastern Construction Co., Ozark, Ala., for the surface treatment. The county also built a new road from the east end of the Bankhead Tunnel to connect with a new bridge built by the Alabama Dry Dock & Shipbuilding Co. connecting Pinto Island with the island on which the east end of the tunnel is located.

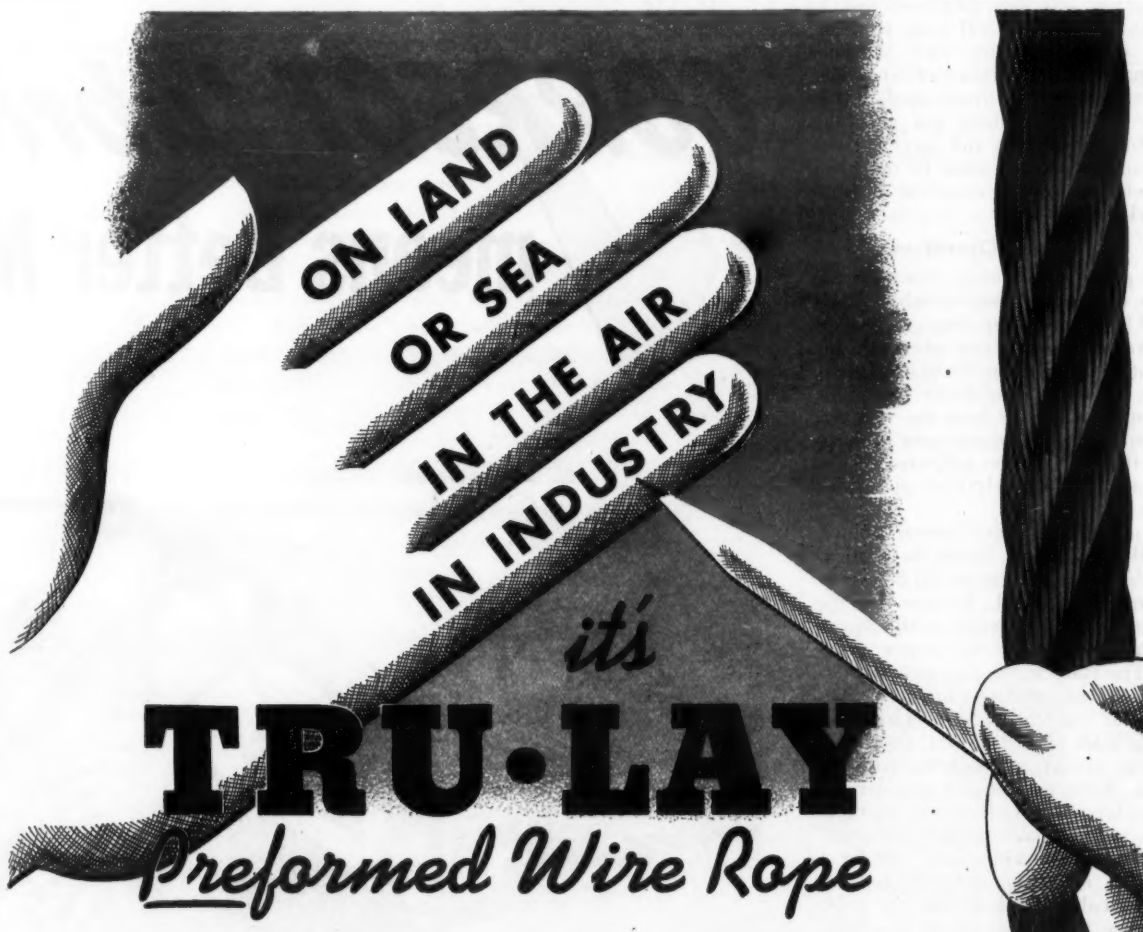
Last spring the county built 2 miles of highway in the Greater Mobile area, financed by $100,000 of gas-tax anticipation bonds. This construction was not eligible for state participation under the new state-aid law because the work was in a metropolitan area not involving farm-to-market roads (see C. & E. M., January, 1944, page 72). The contract was awarded to F. L. Bray Construction Co. of Mobile for approximately $46,000 and consisted of an 18-foot roadway of 6-inch compacted shell base and 100 pounds of plant-mix seal per square yard, supported by a 6 x 12-inch concrete header. The project will serve one of the newer major housing projects.

Road Maintenance Problems

The road maintenance problems of the county have been intensified by two major causes: the first is the great difficulty in getting deliveries of repair parts for the county's power graders and tractors so that more than half of them are out of service at a time when they are greatly needed; and second, the increase in the number of housing projects which have turned over their roads for county maintenance. Private housing corporations have built 500-unit projects with Federal Housing Administration loans, constructing minimum-type roads, mostly sand-clay with a minimum curb and no surfacing. The county took over a number of these, since they met the requirements of the FHA, but the roads were not surfaced and hence require constant blade maintenance. Within the past year FHA has insisted on a 5 or 6-inch plain-concrete pavement on one 587-house project, and on another 175-house project a shell base was laid with a single surface treatment before they were accepted by the county. Several Federal housing projects have been built in which the county has not been asked to take over road maintenance, but it has continued to be done by the housing project management.

(*Concluded on page* 41)

Pouring the 6-inch concrete floor and footings for the new non-priority arch culvert built by Mobile County, Ala.



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Care and Operation Of Electric Welders

Proper Operation, Regular Inspection and Lubrication Essential; Some Hints If You Run Into Trouble

✦ THE importance of electric arc welding, not only in the war effort and in modern steel construction but also in repairing present construction and maintenance equipment to keep it working effectively for a longer period, makes the proper care of electric welding equipment itself an essential activity in the shop of every contractor and every state and county highway department, as well as out on the job.

The same fundamental rules of care for all types of machines apply to electric welders. Careful operation, regular inspection and check-up, and proper lubrication will keep your welders in service, just as they will keep your engines, shovels, or any other machine working efficiently. However, occasionally something goes wrong, and in this article we are outlining not only the rules for proper care and servicing but some suggestions of what to do when your electric welder does not operate properly.

Set-Up and Operation

The proper installation of an electric welder will help to avoid trouble. They should be located where they can be kept as clean as possible, and where air for ventilation and cooling circulates freely. Sets to be used out-of-doors should be adequately protected from the weather. The importance of locating sets in shops where they will not be subjected to mechanical abuse is fairly obvious but often overlooked.

In installing a motor-driven welder, the following points should be particularly observed. The set should be evenly and firmly supported. Be sure that the voltage, phase, and cycles of the equipment are correct for the power available. The fuses in the motor-power circuit should be rated two to three times the motor current rating. Line and welding leads should be well insulated, and large enough to handle the required current. When welding at a considerable distance from any stationary or portable electric welding machine, it is important that the welding cables used are large enough to offset the distance, because too small cables for long-distance welding reduce the output of the machine. The following table will be found helpful in selecting the proper size of welding cable for portable welders used intermittently.

Capacity of Welder Amperes	Length of Welding Circuit in Ft. (Length of Both Cables)		
	60 Ft.	100 Ft.	150 Ft.
100	No. 2	—	—
200	No. 2	No. 1	No. 2/0
300	No. 1	No. 2/0	No. 3/0
400	No. 2/0	No. 3/0	No. 4/0

Every manufacturer provides a wiring diagram so that the customer can make the necessary connections of the welding cables to the welding generator and the incoming power supply line to the driving motor. All connections between the control box and the set are usually already made so that it is necessary only to connect the power line to the proper terminals in the control box just the same as for a motor of similar rating. Great care should be taken in making these connections properly and then following through the specific tests in the manufacturer's instruction book to be sure that each connection is correct and gives the proper direction of rotation.

Maintaining the Generator

The welding-current generator is the unit which delivers the current that permits satisfactory welding when subject to proper control. If the generator is not maintained in A-1 condition, the welding job will not be satisfactory. Proper lubrication according to the manufacturer's instructions and use of a high-grade clean lubricant of the proper consistency for the bearing are axiomatic. Care should be taken to protect the lubricant from dirt after the container has been opened; never leave lubricants exposed. Failure to follow the best practice may result in the burning out of bearings at the time the welder is needed most. Both under-lubrication and over-lubrication are equally disastrous.

Since dust is detrimental to the performance of welding generators, as to all electrical devices, all parts should be cleaned regularly with a vacuum cleaner or blown out with clean dry compressed air at about 25 to 30-pounds-per-square-inch pressure. Higher pressures will drive the dirt into the windings and injure the insulation. Where the machines are operated in atmospheres containing highly abrasive material, compressed air should not be used except at very low pressures, and vacuum cleaning is preferred. Welding sets which operate constantly in an atmosphere of dust should be fitted with air filters.

About every four months the driving-motor and the welding-current generator windings should be thoroughly cleaned by vacuum or by compressed air. Care should be taken to direct the air away from bearings and bearing seals so that dust will not inadvertently be blown into the bearing seals, and thereby eventually reach the bearings, with disastrous results. At the same time insulation-resistance tests should be made, as excessive heat or unusual atmospheric con-

(*Continued on page* 34)

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STANDING ROOM ONLY FOR DURATION

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CORRECT lubrication makes for better maintenance by preventing excessive wear.

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Where operating conditions threaten excessive wear and overhaul shutdown there is a lubrication problem. Consult us about it.

(Write for "The Service Factor" — published periodically and devoted to the solution of lubricating problems.)

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FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

Fuel Situation Will Be Most Critical Next Winter

An appeal has been issued by the office of the National Fuel Efficiency Program for the utmost conservation in the use of fuel. It is pointed out that the fuel situation is now critical and may become progressively worse, reaching really serious proportions in the winter of 1944-45. If, however, steps are taken now to insure the most efficient and careful use of present fuel stocks, this situation may be alleviated.

All users of fuel and energy are asked to cooperate in this fuel conservation program. State and county highway departments, using large amounts of electricity and fuel in lighting, running and heating their shops and garages can aid in this effort, as can contractors, and all citizens of this country. Fuel is vital to victory, so use yours wisely.

New Hardening Solution To Extend Life of Parts

A new steel hardening solution known as Super Temp, a companion to the Steel Temp solution, has recently been announced by the Steeltem Chemical Co., 51 E. 42nd St., New York 17, N. Y. Super Temp is designed for hardening steel to be used for friction wearing parts and cutting tools. It is not recommended for tools or parts subjected to severe shocks and blows, as the Super Temp process attains a maximum hardness without the need of drawing. The manufacturer suggests its use for gears, pinions, axles, shafting, and similar parts to prolong their performance and service life, and minimize replacements.

A bulletin announcing Super Temp and listing the many uses of steel thus specially hardened may be secured direct from the manufacturer by referring to this item.

New Chief Engineer Named by LeTourneau

Announcement has been made by R. G. LeTourneau, Inc., Peoria, Ill., of the appointment of Thomas Backus, formerly Chief Engineer for the Fuller Mfg. Co., Kalamazoo, Mich., as its Chief Engineer in complete charge of LeTourneau designing, detailing, equipment testing and maintenance of quality. Mr. Backus has been associated with General Motors, Willys-Overland, Spicer Mfg. and Clark Equipment companies, and has long been a member of the Society of Automotive Engineers.

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New Life for 350,000 more Americans

New power for new farms, new industries, villages and cities, water for more than a million thirsty acres—all this is made possible by 15,000,000 yards of aggregates which are the basic ingredients of mammoth Grand Coulee Dam. Even more fundamental, specially where the contractor is concerned, is the cost of producing aggregates for dams like this, or for highways, airports, industrial or residential building. The difference of even a few cents a ton, on the cost of producing that aggregate, may mean the difference between profit and loss or between getting the contract or not getting it.

Tomorrow's construction projects hinge on low cost aggregates! IOWA, devoted exclusively to the manufacture of Cedarapids equipment, will be more than ever Headquarters for aggregate producing equipment for the boom periods that lie ahead.

IOWA MANUFACTURING COMPANY
CEDAR RAPIDS, IOWA

C. & E. M. Photo
The forms for the river piers were used repeatedly and were moved by barge from pier to pier.

New Bridge Improves Georgia Main Route

(*Continued from page* 1)

structure is the wartime substitute expansion joint which takes the place of the usual forged steel rockers or bronze plates used to take care of expansion in a structure of this type. The sliding joint under the girders at the expansion ends consists of two layers of Johns-Manville service asbestos sheet packing, Style No. 60, $\frac{1}{16}$ inch thick, with the graphite surfaces turned together.

Piers 23 through 27 are the river piers and piers 24 and 25 support the 150-foot span. The two outside footings for piers 23, 26, and 27 are 12½ x 15 feet with thirty timber piles spaced 30 inches on centers both ways. The third, or inside, footing measures 17½ feet square and has forty-nine piles on the same spacing. Piers 24 and 25 have outside footings 20 x 22½ feet with seventy-two piles and inside footings 20 feet square with sixty-four piles.

The heavier columns, three to a pier, on piers 24 and 25 are 4 x 5½ feet at the top and battered ⅛ inch in 12 inches. The columns for piers 23, 26, and 27 are 4 feet square at the top with the same batter. The columns for the river piers average 40 feet in height, giving a 35-foot clearance at MLW. The five river piers have a web wall 15 inches thick and 15 feet high starting at MLW. Each of these piers also has a cap with an arched bottom with a 2-foot rise in the center. These caps are 7 feet high at the center and 9 feet at the columns.

The approach bents on land have no web walls but the cap is arched to give the same effect. The cap arch has a 1-foot 6-inch rise with a depth of 3 feet at the top of the arch and 4 feet 6 inches at the columns.

Foundations and Footings

In the river piers each footing had a separate cofferdam. The centers of the footings are 26 feet apart. They were poured with a 19-foot seal and the top of the footing 5 feet above the top of the seal.

The cofferdams were driven on the neat size of the seal, leaving just sufficient space for the insertion of the footing forms, about 1 foot all around. The 55-foot Bethlehem steel sheet piling was driven by a Vulcan Super No. 5,000 steam hammer, using the contractor's steam derrick with a 90-foot boom and swinging leads. This derrick is mounted on a 36 x 75-foot wood barge and the derrick is operated by a 3-drum Lidgerwood hoist. The small amount of leakage into the cofferdams was readily stopped by a mixture of half-and-half sawdust and cement which was dropped down the outside along the joints that were leaking.

The cofferdams were excavated down to the elevation of the bottom of the seals by a Northwest crane on a 36 x 75-foot wood barge, using an Owen ¾-yard clamshell. This was followed by the driving of the wood foundation piles to a penetration of 20 to 25 feet for a minimum 20-ton load. The footing piles for the river piers were driven by the steam hammer while those on land were driven by a drop hammer.

For driving the sheet piling the contractor used two double sets of 12 x 12-inch wales spaced 8 feet apart vertically as guides and bracing for the completed coffers when they were unwatered.

The cofferdam was unwatered and kept dry by various combinations of the three Jaeger Sure-Prime pumps: a 6-inch, a 4-inch and a 2-inch. A Rex 2-inch Speed Prime was kept on the barge with the Northwest to provide water for washing the seal ahead of pouring the footing in order to remove the laitance that had been hand-picked off and mostly shoveled out. The barge was held closely in position for its work at the cofferdams, handling reinforcing steel, piles, forms and pouring concrete, by a pair of 5-ton Beebe hand hoists with ½-inch wire rope running through two single sheaves at the ends of the barge and moored to rings in adjacent structures. The foundation piles for the south approach spans were unloaded from the detour bridge on to the marsh and then snaked across to the piers. The piles for the river piers were delivered on the north bank of the river and then barged out.

The piles extended through the seal concrete and 1 foot into the footing and were cut off at the proper elevation by hand cross-cut saws. The seal extends about 15 feet below the river bed and was poured with the same mix of concrete used for the footings, except that

(*Continued on next page*)

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F-33 SCRAPER

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KALAMAZOO 11 MICHIGAN

Sound reasons why its margin of Superiority should be on your side

● In the tremendous burst of construction activity which nearly every authority foresees immediately after war's end, you can't count on long profits and easy bidding. Quite the contrary . . . and that's where every advantage you can muster on your side is going to count tremendously.

That is why shrewd and far-sighted contractors are now taking steps to make sure the margin of superiority given by Sullivan equipment will be on their side . . . why they want to be sure *they* have the rock drills, spaders and paving breakers with the high speed, hard hitting, long life that Sullivan construction gives . . . why *they* want the long lived, dependable Sullivan compressors and hoists . . . why they want the advantages that Sullivan's 92 years of experience have made possible. You too should take steps to be high on the priority list that later is sure to be crowded. Why not get in touch with your nearest Sullivan distributor or Branch Office *now?* . . . SULLIVAN MACHINERY COMPANY, Michigan City, Ind. *In Canada:* Canadian Sullivan Machinery Co., Ltd., Dundas, Ontario.

OFFICES: Birmingham, Ala. • Boston, Mass. • Butte, Mont. • Chicago, Ill. • Claremont, N. H. • Dallas, Tex. • Denver, Colo. • Duluth, Minn. • El Paso, Tex. • Huntington, W. Va. • Knoxville, Tenn. • Los Angeles, Calif. • Middlesboro, Ky. • New York, N.Y. • Pittsburgh, Pa. • Portland, Ore. • Salt Lake City, Utah • San Francisco, Calif. • Seattle, Wash. • St. Louis, Mo. • Washington, D.C.

From left to right: Sullivan L-57 drill, K-81 Paving Breaker, Q-81 Sheeting Driver, M-2 Spader. Through most of the line the famous Sullivan Dual Valve is used . . . self-evident proof of this exclusive feature's functional superiority.

Toughest compressor test is use in rental fleet. Choice of Sullivan Zephair Compressors by largest fleet owners testifies to Zephair's construction, design, dependability.

Power, compactness, long life feature Sullivan "Turbinair" hoists, for all construction work. Positive brakes. Oversize drums. Simple design.

Maneuverability positive brakes, hydraulic drill positioning are some of reasons contractors prefer Sullivan Wagon Drills . . . outperforming others on every job.

There Is No Substitute for Experience • Sullivan Experience Is 92 Years Long and World-Wide

PRODUCTS
PORTABLE COMPRESSORS • STATIONARY COMPRESSORS • ROCK DRILLS • WAGON DRILLS • CORE DRILLS • PORTABLE HOISTS • SPADERS • PAVING BREAKERS • TRENCH DIGGERS • SHEETING DRIVERS • ***AND OTHER PNEUMATIC TOOLS.***

SULLIVAN

CONTRACTORS' EQUIPMENT PROVED THE WORLD OVER

Concreting Operations For Bridge at Darien

(*Continued from preceding page*)

the seal was enriched with 10 per cent additional cement.

Upon completion of the work on the foundation piles, the seal and footing, the steel sheet piling was pulled by a Union steam-driven extractor. A separate horizontal steam boiler was set up on the south bank to provide power for operating the extractor when removing steel sheet piles driven by a 3,000-pound drop hammer on the land bents. The hammer was swung by a Northwest crane with swinging leads.

Concreting Plant and Methods

The concrete mixing plant for this job was set up on the north bank of the Darien River just east of the bridge. Gravel furnished by the Roquemore Gravel & Sand Co., Montgomery, Ala., was trucked to the site from a Seaboard Railroad siding about 10 miles from the bridge. The sand was furnished by the Dawes Silica Mining Co. from its pit at Doctortown, Ga., trucked from the same siding, and stockpiled alongside the gravel on planked areas bulkheaded to separate the two. A Northwest crane with a ⅝-yard clamshell bucket maintained an adequate supply of the aggregates in the two-compartment bin of the Heltzel batching plant. This plant batched for a pair of Jaeger 3-bag mixers set up just in front of and below the batchers so that the batches were dropped through chutes to the skips. The two mixers delivered to a pair of chutes which terminated over an industrial railway track on which a single flat car pushed by a Whitcomb gasoline locomotive ran to and from the concrete plant. The locomotive was at the north end of the car so that it ran in under the platform each time it pulled the car in for another load. The flat car carried a side-dump hopper with a double-lever control so that it could be dumped from either side. City water and Alpha cement were used for the concrete. The plant was designed to produce about 20 cubic yards of concrete per hour and maintained this very well on the pours, which ran as high as 300 cubic yards for the seal.

The industrial railway track on which the concrete train was operated ran across the stream except for a 90-foot break in mid-stream. The trestle for the industrial railway consisted of 3-pile bents on 16-foot centers with 10 x 10-inch caps and 6 x 10-inch stringers and 3 x 8-inch cross ties. The track was planked down the center to provide a walkway.

Concrete for use on the south side of the stream was transferred by a 1-yard Blaw-Knox Roller-Gate bottom-dump bucket swung by the steam derrick to a duplicate hopper car and locomotive on the south trestle. This method was continued until the south approach fill was completed when a duplicate concrete plant was installed there for the balance of the concreting on that side.

The seal concrete was placed under water, using a special home-made bottom-dump bucket instead of a regular tremie. It is a cylinder about 24 inches in diameter and 5 feet long with a pair of hinged doors at the bottom, arranged to close tightly. The bucket was swung with two lines, one for handling the bucket and attached to the bale and the other fastened to a bar running through to the gates and attached to them through two hinged bars. By slacking the second line the gates were opened, placing the concrete with the minimum of disturbance within the body of concrete and reducing the amount of laitance.

C. & E. M. Photo

The concrete plant on the north shore of the Darien River consisted of twin Jaeger 3-bag mixers with delivery chutes leading over the industrial railway track. Falsework for the north span is seen at the left.

When concreting the deck at the north end of the structure, the concrete was handled on the industrial railway and delivered to the Blaw-Knox bucket swung by the Northwest crane on the barge, raised up to the deck and wheeled in rubber-tired buggies back to the pour. On the south approach spans the concrete was carried up by an elevator and buggied from the top of the elevator.

The contractor insured good finish for the concrete deck by building a 43-foot longitudinal screed of wood with a steel channel on the strike-off edge. A wood truss over the top had eleven ¾-inch rods with turnbuckles to adjust the channel and insure a true straight

(*Concluded on page* 65)

COMPLETE
WELL POINT SYSTEMS
WILL DRY UP ANY EXCAVATION
Faster—More Economically
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MOVED THREE TIMES
TRAVELED 750 MILES
PRODUCED 149,121 TONS
in 8 months

...WE STARTED OPERATING IN MARCH AT BISHOP, CALIF.

"At Bishop, we ran 52,480 tons, after which we moved the plant to Wells, Nevada where we ran 20,033 tons. We used it next at Ely, Nevada where we ran 48,019 tons and then moved it to Austin, Nevada where we ran 28,589 tons making a total of 149,121 tons. We finished on November 6th and would have run about 40,000 tons more had it not been for the early storms...."

Reported by ISBELL CONSTRUCTION CO.

...with a Madsen Plant

A BUSINESS TRIP with an asphalt plant can be a faster, more profitable trip when the plant is a Madsen.

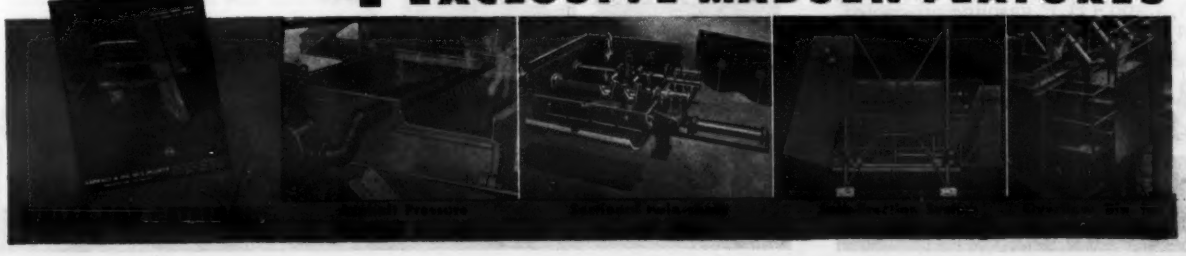
Madsen Plants are easier to dismantle and move because they're built in three portable units—require a minimum dismantling. Easier to erect because they're equipped with the Madsen-patented Jack-Erection System—no cranes, skids or extra devices are required to set up a Madsen Plant.

Faster batch mixing because they're equipped with Asphalt Pressure Injection—asphalt is sprayed into the tumbling aggregates in the mixer. Aggregates and oil are more thoroughly incorporated in a shorter mixing time. You get greater production because this time-saving means 25 to 40 more batches in an 8-hour day.

Write for new catalog; learn about the many Madsen exclusive features. Unit-Power Transmission; the extra fast mixing cycle; the sectional mixer, and many others. Crane-erection as well as jack-erection plants are available.

MADSEN IRON WORKS
HUNTINGTON PARK, CALIFORNIA

4 EXCLUSIVE MADSEN FEATURES



Connecticut's Road Maintenance Policy

Nutmeg State Sets Up a Standard and Method of Handling Operations on All Types of Roads

✦ "WITHOUT a policy no success can crown a project" should have been the wise saying of some sage of yore, but it is true just the same. Connecticut, ever since the days of that grand old man of maintenance, George E. Hamlin, has had a policy of planned, careful, economical maintenance. How this is continued under the administration of Commissioner William J. Cox and A. L. Donnelly, Director of Roadway Maintenance, with his assistant, W. H. Carsten, is told below.

Maintenance Policy

It is the policy in Connecticut to maintain pavements true to the type, shape, line and grade of either their original construction design or such subsequent remodeling as may have been made. In cases where the condition of a given pavement makes it impractical or uneconomical to continue the usual method of maintenance for that type of pavement, a change of method is adopted even though the new method substantially changes the type of the pavement. Under all circumstances, the surface of pavements is kept unbroken and reasonably smooth for traffic use.

Earth and Gravel Roads

Untreated-earth and untreated-gravel road surfaces are shaped with a grader or road hone as early in the spring as is practical and again in the autumn before the ground freezes. They are brought up to a uniform cross section and made smooth and even, with material added as needed. If necessary, the surfaces are scarified to permit adequate movement of the surface material, but care is taken during the scarifying and grading operations that soil at the edges of, or under, the road surface is not mixed with the surface material.

In general, the road is brought as nearly as possible to its original cross section, but in case this is not known, the surface is crowned approximately ½ inch to a foot. The graded surfaces are compacted by rolling or dragging and the roller or drag is loaded as much as required to obtain the desired degree of compaction. Holes and depressions that develop between seasonal shaping operations are patched with materials similar to that in the surface.

Surface-Treated Highways

Earth, gravel, crushed-stone and like highways which have been surface-treated are given a standard bituminous surface treatment as frequently as necessary to keep the surface smooth, even and sealed. When pavements show a tendency to become rough or corrugated but there is no need for a standard bituminous surface treatment, they are planed or honed so as to remove surface material from the high spots and distribute it into hollows or depressions. The hones are loaded as much as necessary to obtain the desired amount of cutting.

Between surface treatments, frequent inspections are made to ascertain the cause of breaks and the need of patching and to correct conditions which lead to the need for patching. When patching actually becomes necessary, the surface of depressions and holes is roughened and enough of the surface is removed so that clean bituminous material or road metal is exposed over the entire area to be patched. An approved pre-mixed patch material is then placed and tamped into position. The surface of the patch must conform smoothly with the remaining surface of the pavement.

Hot-Mix and Penetration Pavement

Bituminous-concrete and bituminous-penetration pavements are given a standard bituminous surface treatment, or a stone surface treatment, or both treatments, whenever resurfacing or sealing is required because of oxidation, age, wear, or other conditions. Patching procedure is the same as for bituminous surface-treated pavement except that the patch material used is a bituminous concrete similar to the material used in the construction of the pavement. Areas where pavements are bleeding are immediately covered with sand. Care is taken that too much sand is not placed in these areas but only a sufficient quantity to absorb all bituminous material which has broken through the surface.

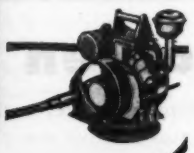
Concrete Pavement

Cracks and expansion joints in concrete pavements are filled with bituminous material in the late summer months and throughout the rest of the year as required. They are first cleaned by removing dirt, other foreign material, and disintegrated joint material. It is sometimes desirable to remove some of the joint material that has not disintegrated so that the new material will have a good bond. Dust is removed by an air jet.

After joints and cracks are thoroughly

(Continued on page 38)

BAILY CONCRETE VIBRATORS



PAVEMENT VIBRATORS

Three types: *Vibrating screed*, full-width, propelled by hand-operated winch and cable or pushed ahead by finishing machine. Gasoline power plant.

Tubular internal, extending entirely across slab, mounted in front of finisher. Gasoline or electric power plant with flexible shaft drive.

Vibrating pan, full-width, carried by two-wheeled trailer behind any standard finisher. Gasoline or electric power plant.

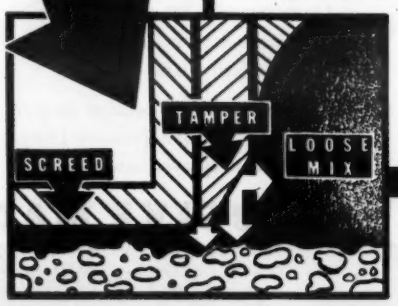
STRUCTURAL CONCRETE VIBRATORS

1, 3, and 4 H. P. gasoline, air-cooled, 4 cycle motors; flexible-shaft drive; interchangeable vibrator heads lubricated for life. Wheelbarrow carriers.

Pioneers in Concrete Vibrators

BAILY VIBRATOR CO.
1539 WOOD STREET PHILADELPHIA, PA.

Asphalt Tampers



Joe was an early model asphalt tamper. Wearing his heavy wooden shoes, Joe got out on the hot, steaming mat and pounded down the spots around manholes and gratings that had to have tamping while the mix was hot. His boss used to wisecrack that Joe knew asphalt from the ground up. That's why he's running a Barber-Greene Finisher today—Joe knows the value of tamping while the mix is hot.

Joe is tamping 1200 strokes a minute now. Tamping the mix hotter than he could walk on it, even with his wooden clogs, while it is in the best workable condition. The roller that follows Joe and his B-G Finisher adds about an eighth inch final compaction. And the depressions are full of compacted material, not struck off material that will compress under traffic and repeat depression on new surface.

The bevelled face of the tamping bar does the actual compacting. It pushes the material forward as well as down, forcing the hot mix into the voids and produces a dense mat. The travel of the tamper imparts a rolling movement to the loose mix in the spreading chamber which prevents any segregation of material. The follow-up screed is level with the bottom stroke of the tamper bar and adds its weight to compacting the mat.

44-9

BARBER GREENE
AURORA, ILL., U. S. A.

Centrifugal Castings Discussed in P-M Catalog

The advantages of centrifugal steel castings versus ordinary sand castings are discussed in an 11-page catalog issued by the Foundry Division of the Pettibone Mulliken Corp., 4700 W. Division St., Chicago 51, Ill. Typical examples of centrifugally cast tubes, clutch sleeves machined from tubular stock, gears, sprockets and sheaves are shown in the illustrations, as well as comparative photomicrographs of cross sections of sand-cast and centrifugally-cast steel. A feature of the catalog is the section on special shapes which can be produced by the PMCO centrifugal casting technique.

Copies of the catalog are obtainable from the Pettibone Mulliken Corp., upon written application.

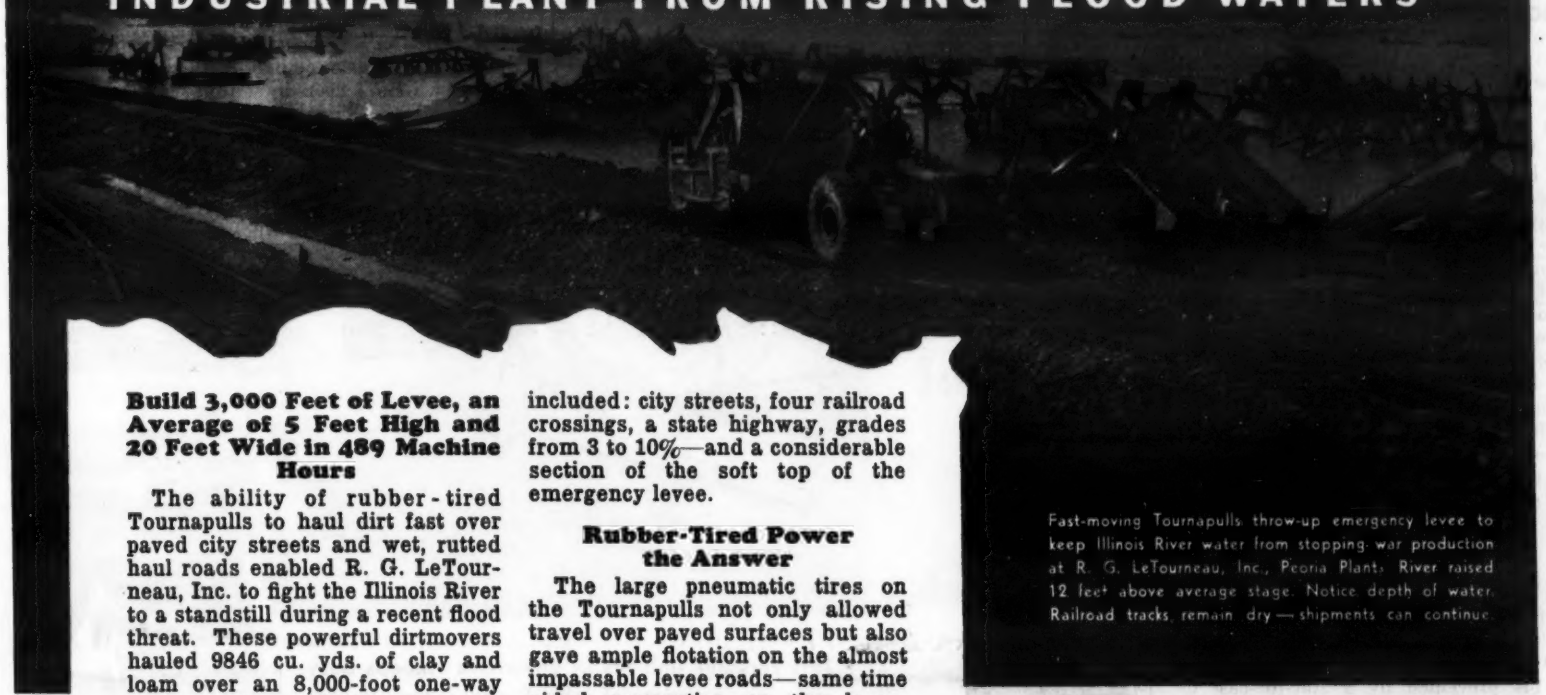
Guide for Maintenance Of Rex Moto-Mixers

Users of Rex Moto-Mixers will be interested in a timely booklet on their care and maintenance which has been made available by the Chain Belt Co. The 21-page booklet, Bulletin No. 441, covers such subjects as cleaning, oiling, water control, operating hints and general maintenance and repair, and in addition gives simple descriptions of the construction of different mixer parts and how they operate. Features of the book are a lubrication chart and a check-up list to simplify the maintenance procedure. The text is pointed up by amusing illustrations in color.

For copies of Bulletin No. 441 write to the Chain Belt Co., 1666 West Bruce St., Milwaukee 4, Wis., and mention this review.

HIGH-SPEED *TOURNAPULLS* SAVE

INDUSTRIAL PLANT FROM RISING FLOOD WATERS



Fast-moving Tournapulls throw-up emergency levee to keep Illinois River water from stopping war production at R. G. LeTourneau, Inc., Peoria Plant. River raised 12 feet above average stage. Notice depth of water. Railroad tracks remain dry — shipments can continue.

Build 3,000 Feet of Levee, an Average of 5 Feet High and 20 Feet Wide in 489 Machine Hours

The ability of rubber-tired Tournapulls to haul dirt fast over paved city streets and wet, rutted haul roads enabled R. G. LeTourneau, Inc. to fight the Illinois River to a standstill during a recent flood threat. These powerful dirtmovers hauled 9846 cu. yds. of clay and loam over an 8,000-foot one-way haul in 489 machine hours . . . kept the emergency levee at an average of 2 feet above the rapidly raising waters.

Without Tournapulls, this emergency dirtmoving job would have been impossible. The haul route included: city streets, four railroad crossings, a state highway, grades from 3 to 10%—and a considerable section of the soft top of the emergency levee.

Rubber-Tired Power the Answer

The large pneumatic tires on the Tournapulls not only allowed travel over paved surfaces but also gave ample flotation on the almost impassable levee roads—same time aided compaction on the levee. Plenty of excess power and rimpull for Tournapull weight permitted top speeds up to 14.9 m.p.h. on parts of the haul . . . also enabled the rigs to handle the adverse grades and to pull through the muddy spots.

COMPARE WITH OTHER METHODS

Problem: To move 9,846 cu. yds. over 8,000-foot one-way haul for emergency levee.

EQUIPMENT	Tournapulls Model Super C with 11-Yard Carryall	Tractors 90 H.P. Model with 11-Yard Scraper	Shovel 1¾-Yard Model 18—4-Yard Trucks
MACHINE HOURS REQUIRED	Actual Performance 489	Estimated Performance 1315	Estimated Performance 608

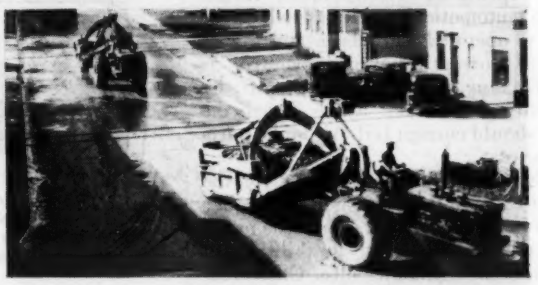
NOTE: Performance based on 40 minute hour or 66⅔% efficiency because of delays on haul route waiting for traffic at state highway, trains at railroad crossings and normal traffic flow of trucks and trains from shipping department.

High-speed, rubber-tired Tournapulls built this 3,000-foot levee in 45.5 hours with an average use of 11 rigs. With tractor-drawn equipment it would have taken 29 units to do the same job in an equal amount of time. The truck and shovel time could not be improved by adding units as 18 is the maximum for cycle loading on 8,000-foot one-way haul.

Ask About TOURNAPULLS for Your Jobs

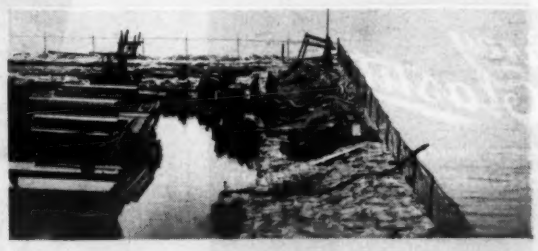
For lowest-cost postwar earthmoving, plan to use the rubber-tired power of Tournapulls. More than 1,800 are now in use. For detailed information on Tournapulls, write TODAY for the new 8-page informative booklet — "The Trend to Rubber-Tired Power". Address: R. G. LeTourneau, Inc., Dept. CEM 644, Peoria, Illinois.

Large Tournapull and Carryall tires made hauling over paved streets possible. On 16,000-foot round trip, Tournapulls turned 10 corners, crossed 4 railroad tracks and a state highway.



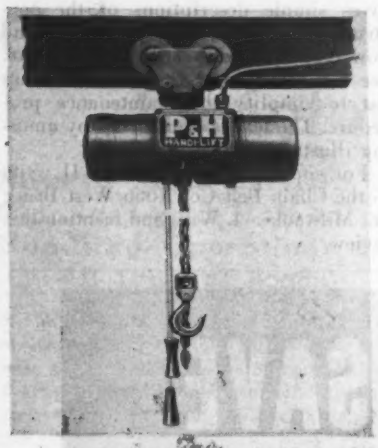
Tournapulls were required to end-dump on one part of the levee. These earthmovers had plenty of power and maneuverability to back over the 9 loose yards. This eliminated much Dozer work; dirt could be placed near end of narrow levee.

275 feet of sandbag levee connects two sections of the dirt levee. Over 8,000 man hours were used to build this sandbag section — only 700 man hours for the 3,000-foot dirt levee.



LE TOURNEAU
PEORIA, ILLINOIS . STOCKTON, CALIFORNIA

TOURNAPULLS RUBBER-TIRED POWER FOR FASTER EARTHMOVING



The new P & H chain hoist.

Electric Chain Hoist Added to P&H Line

The new small Handi-Lift electric chain hoist, recently announced by the Hoist Division, Harnischfeger Corp., 4419 W. National Ave., Milwaukee 14, Wis., has a number of new features. Increased utility is claimed for the Handi-Lift by quick interchangeability to bolt, hook or trolley mounting, with the changeover requiring only the loosening of one bolt. Also, in trolley service, it can be suspended either parallel or crosswise to the beam for greater flexibility. Fully enclosed construction permits its use under any condition of weather, dust or moisture.

While the unit is rated at 500 pounds, the hoist motor supplies a high reserve capacity, and the chain is proof-tested for 1,800 pounds. Operation is by a handy pull cord actuating a simple lever toggle arrangment, which leaves one hand free to guide the load. The chain wheel, which is forged of high-carbon steel and heat-treated, is splined to the drive gear. Over-travel of the hook at both the upper and lower limits is prevented by a zinc-die-cast safety limit stop which also actuates the control for raising and lowering loads. Dual braking is provided by a large spring-set electric-motor brake which automatically releases when the hoist is operated and sets instantly with shut-off current. Lowering control is by dynamic means supplemented by the spring-set brake which holds the load, should current fail. All brake parts are die cast.

The manufacturing standards for the Handi-Lift are the same as for all other hoists in the P & H line, to provide maximum dependability and durability with a minimum of maintenance. Other features of its construction are anti-friction bearings throughout; a simplified planetary gear drive with husky drop-forged stub-tooth gearing; flood lubrication requiring only infrequent attention; and silver-to-silver switch contacts giving a positive trouble-free circuit. The Handi-Lift motor is of the high-starting-torque reversible type with bearings sealed in grease for their lifetime. The unit operates on 3-phase 60-cycle 220 or 440 volts and is shipped complete, ready to install.

Copies of the Handi-Lift bulletin No. H-23, giving specifications and further information, may be secured direct from the manufacturer.

New Appointments Made In I-H Power Division

Announcement has been made of several new appointments in the recently organized Industrial Power Division of the International Harvester Co., Chicago, Ill., which, with H. T. Reishus as General Manager, has assumed direction of the company's entire industrial power business. The Division has its own sales organization, headed by Neil Higgins, with G. A. Gilbertson and W. M. Parrish as Assistant Sales Managers, and R. C. Flodin, Assistant to the Manager.

Mr. Gilbertson will direct the activities of zone managers in the various parts of the country and maintain contact with distributors, dealers and servicing branches, while Mr. Parrish will, as in the past, contact manufacturers in the direct sale of International industrial power.

Other personnel of the new division include D. B. Baker, Manager of Engineering; H. B. Rose, Manager of Manufacturing; W. M. Holland, Manager of Supply and Inventory; W. W. Black, Supervisor of Service and Parts; and E. A. Braker, in charge of Sales Engineering which also includes allied equipment and modified units. J. W. Phillips is General Superintendent of the company's large tractor works in Chicago, while R. E. Bloye holds the same position at the Milwaukee works.

Peerless Pump Official Dies

Vernon Edler, Vice President and General Manager of the Peerless Pump Division of the Food Machinery Corp. died at his home in Los Angeles on May 1. Mr. Edler, who was widely known in the pump manufacturing industry, founded the Vernon Edler Corp. shortly after World War I. When this company was merged with the Food Machinery Corp. in 1929, he became Resident Manager of the corporation at Los Angeles, and in 1935 was elected to the vice presidency when he became General Manager of the Peerless Pump Division.

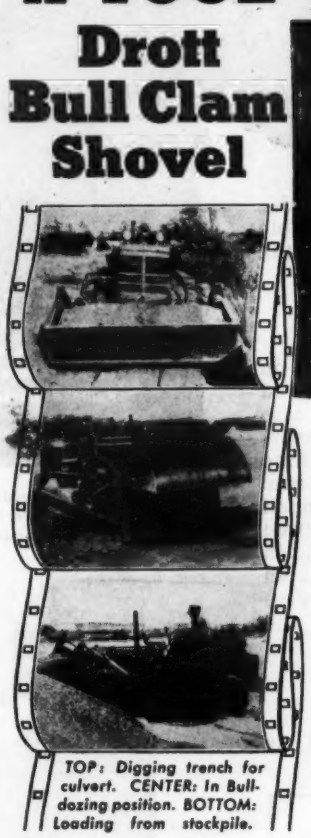
New Brochure Describes Portable Electric Drill

The history, development, features and specifications of the recently introduced Thor plastic-housed portable electric drill are contained in an attractive new brochure just issued by the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago 6, Ill. Featuring the "armored-in-plastic" character of new Thor tools, the booklet gives full information on this ¼-inch universal electric drill which, the manufacturer states, is 14 per cent lighter in weight than old-style drills. The skeleton-frame construction of the internal mechanism and the design of the plastic housing permit a 30 per cent reduction in servicing time, and its sturdy and rigid construction enable it to withstand rigorous treatment.

Copies of this brochure may be secured by interested contractors and engineers by writing on their company or official letterhead direct to the manufacturer.

A TOOL WITH MORE USES

Drott Bull Clam Shovel



TOP: Digging trench for culvert. CENTER: In Bull-dozing position. BOTTOM: Loading from stockpile.

TOP: Clearing way for grading work. CENTER & BOTTOM: Finishing ahead of graders.

This versatile unit fits in anywhere...keeps busy on a great variety of jobs. Prepares the way for grading by handling your clearing — roots out trees and stumps, carries and dumps them... or hauls 'em away. Digs, floats, lifts and loads material—ideal for any cut and fill work. Use it to excavate for pipe placement, bridge and culvert construction, special ditch work, etc. Can always be operated as a bulldozer—simply by opening clam! The clam adds all-purpose usefulness to this required tool. When it comes to finishing —you will go through it in no time with the Drott Bull Clam Shovel working ahead of your graders. Plan on this all-'round outfit for your Postwar Construction. Write for literature NOW!

OPERATED BY
DROTT POSITIVE, CLOSED HYDRAULIC SYSTEM
SMOOTH • QUICK
Keeps dirt and air out... keeps oil in! Used successfully on Drott equipment for many years.

★

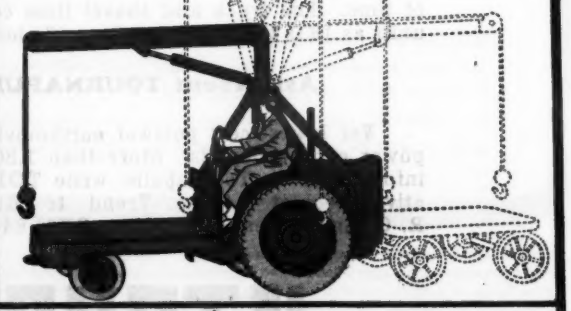
DROTT BULL CLAM SHOVEL FITS ALL CURRENT MAKES AND MODELS OF CRAWLER-TYPE TRACTORS
30 TO 130 H. P. 4 SIZES — 1 TO 4 YDS. CAPACITIES
IDEAL FOR SANITARY FILL WORK!
GET THE COMPLETE STORY!

—Send for this Book.

"ANSWER TO YOUR WASTE DISPOSAL PROBLEMS...WITH THE DROTT BULL CLAM SHOVEL"

FREE!

ANOTHER DROTT OUTFIT...WITH A NEW KIND OF PERFORMANCE
DROTT GO-DEVIL TRACTOR CRANE



Ideal for use in shop or yard... or loading and unloading gondolas, boxcars, transport trucks! Handles loads up to 2,000 lbs. Boom swings a full 375°, extends to 90", reaches to 14' 9". Drott positive, closed hydraulic system controls steering and operation! Write for literature.

DROTT UNIVERSAL EQUIPMENT ..Write HI-WAY SERVICE CORPORATION 3841 W. WISCONSIN AVE., MILWAUKEE 8, WIS. 730 MUNSEY BLDG., WASHINGTON 4, D. C.

Carey Elastite EXPANSION JOINT
Standard in Concrete Construction for 31 Years
ECONOMICAL and EFFICIENT
Asphalt Joint
Fiber Joint
Sub-Grade Felt
THE PHILIP CAREY MFG. CO.
Dependable Products Since 1873
LOCKLAND, CINCINNATI, OHIO

Safety and Economy On Construction Jobs

Proper Planning of Any Project Must Include a Careful Consideration of Methods Designing, Traffic

By J. L. SHIELY, President, J. L. Shiely Co., Inc., St. Paul, Minn.

✦ THE proper planning of a construction job has been and always will play an important part, no matter how large or how small the job. We know that a safe job is an economical job. Naturally, we want a safe job, and, naturally enough, we want an economical one too. We realize too well that the business mortality in the construction industry is higher than in any other type of industry. Contracting is a hazardous business. Risks are part of the business. There is a point where safety can cost more than the risk you take. This is not the only consideration; there are others. Methods determine whether the job will be operated at a profit or loss. Methods often determine whether employees live, or die of accidental injuries. To insure profits and safe operation, the methods employed must be designed well and accurately for the job at hand.

Methods Designing

Contractors know that a lot of thought and consideration is given by engineers of design and architects when the plans for projects are being drawn. At the start of the design, there may be quite a number of rough sketches drawn before the final, most economical or best arranged layout is prepared. When these designers have their thoughts on paper, the drawings come into the hands of the contractors. We, the contractors, who have the responsibility for planning the construction job, might term ourselves the "methods designers," as we must design the method for producing in the field what the designers have already produced on paper. A good methods designer must continually adapt himself to the individual conditions on each new job and produce the designed methods which will insure completion of the project with the most dispatch, greatest profit, and with the least risk.

The Methods Engineer

Before you have advanced very far on a typical job, you realize that your organization chart should have included an engineer who should have the following qualifications for the medium-size job you are doing. He should be 25 to 40 years of age, with as much construction experience as possible, and he should have a reasonable consideration of the expenditure fund. He should be able to analyze your insurance problems clearly, know the state, federal and municipal laws and the kind of coverage which you require, your relationship with subcontractors and the liabilities caused by visiting officials, inspectors, vendors, agents and the like. He should understand the crafts you employ, have a knowledge of scaffolds, supports, ramps, frames, roofs, steel shapes, beams, floor-loading, steel cable, etc. He must know amperes, direct current, alternate current, oil immersed fuses, crane booms, king pins, block sheaves, steam, compressed air, and all types of oil or gas engines. He must know lighting, sanitation, sewage disposal, fatigue conditions, first aid, fire compliance and be able to assist in contested cases which resort to law. He must know what goggles, respirators, aprons, signs, shields, helmets, life preservers, safety belts, electric lineman protection equipment, and safety shoes are required and have them available.

I do not know this man, but if I were a young engineer, I should qualify myself for this job, and the next position open would be that of general manager. The general idea I should like to convey is that what we need is not a safety specialist, but a combination of a contractor and safety engineer who knows the risks before they are taken and can evaluate them.

Safety a Productive Function

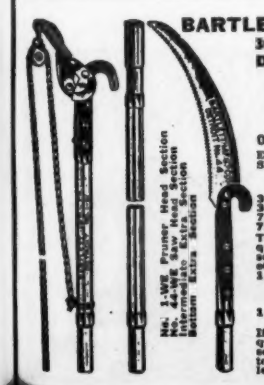
Let's agree that abstract and concrete safety engineering is a productive function of contracting. Let's see first what the prime consideration of safety is likely to be on this typical job. A proper study of each individual phase of the work before the job starts provides the chance to incorporate into the designed methods to be used all precautionary measures that will tend to prevent accidents and save the expense of changes which have to be made later.

On some jobs, management interested itself to such an extent that traffic-control drawings were made and the flow of traffic agreed upon before the job started. A copy of each drawing was distributed to each truck driver and foreman and, as a result, each driver had the advantage of looking over a special road map that had been streamlined for the job he was working on. Some of these drivers even framed these traffic-control drawings and hung them on the walls at home. They were revised from time to time as the job conditions changed, and the locations of accidents were indicated.

Traffic Control Cuts Accidents

A western job covering a large area had many concrete structures, scheduled to be built over the entire area. Batching plants and ready-mixed concrete plants were spotted in the most convenient and economical locations, determined by length of haul to where the concrete was to be used, having in mind a minimum of backing of trucks and located so that the flow of traffic between two points would be void of interruption and delay and that traffic would move in a continuous flow at all times.

(*Concluded on page 46*)



BARTLETT MFG. CO.
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Combination Pruner & Saw
AVAILABLE ON PRIORITIES OF AA5 OR BETTER
EASILY CARRIED IN SMALL CAR OR MOTORCYCLE

Length	Weight
30 in. Pruner	2¾ lbs.
30 in. Saw	1½ lbs.
72 in. Section	2 lbs.
72 in. Section	2¼ lbs.

This combination can be quickly and easily assembled to make either of these two tools:
1 Heavy Duty Tree Trimmer (3¼") capacity) 14½ ft.
1 Fast-cutting Pole Saw 14½ ft.
If other lengths are required, specify extra sections 4 or 8 ft. long, to make the necessary length.

No. 1-WR Pruner Head Section
No. 44-WR Saw Head Section
Intermediate Extra Section
Bottom Extra Section

AN OPEN LETTER

TO THE NATION'S ROAD BUILDERS

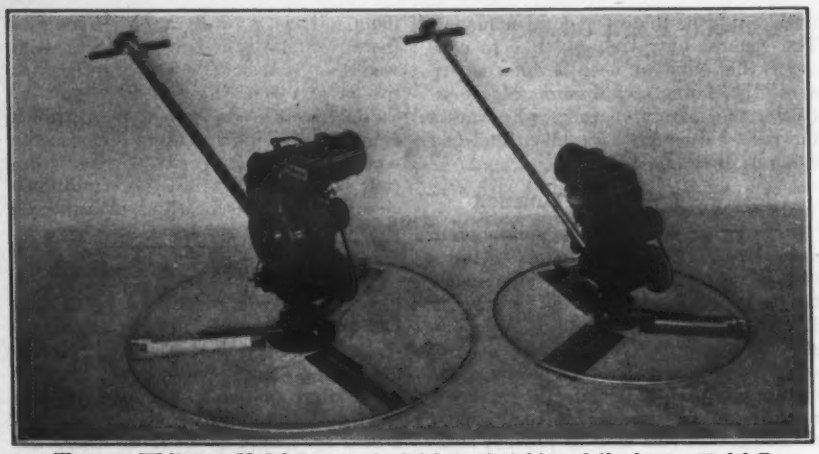
HUBER is pleased to announce plans have been perfected to build a complete line of modern road machinery the moment the war ends. The line will include: Three-wheel Type Road Rollers from 5 to 12 tons; Tandem Rollers from 3½ to 12 tons; Maintainer, Bulldozer, Speed Scoop, Sweeper, Mower and Snow Plow.

To make sure the plans were right, a thorough research into the postwar future of road building and maintenance was made. To these findings were added HUBER'S seasoned knowledge of Road Builder's needs plus its years of experience in building dependable road machinery. With such a background to draw upon, the new HUBER Line becomes an outstanding contribution to the road building industry and the greatest achievement in HUBER'S history.

To insure manufacturing excellence in building this new HUBER Line, thousands of dollars have been invested in the latest of machine tools and production methods. HUBER is proud of its new Road Machinery for it measures up in every way to the big demands that will be made on it when the postwar road building activities start. Distributors interested in the new HUBER Line are urged to write us. Some choice territories are still available.

Don Howard

President.



The new Whiteman Model J concrete finisher, at right, and the larger Model B.

New Small Finisher For Concrete Slabs

Supplementing its line of floating and finishing equipment for concrete slabs and floors, the Whiteman Mfg. Co., 3429 Casitas Ave., Los Angeles 26, Calif., has announced a new light-weight small-diameter machine for use in small or congested areas. Interchangeable trowels permit both floating and finishing operations with the one dual-purpose machine, and the manufacturer states that one man can cover 750 square feet in 15 minutes.

The new Model J finisher operates on the same principle as the larger Model B, with rapidly rotating adjustable trowels. The unit is powered by a Briggs & Stratton air-cooled Model N 1½-hp engine, and has a trowel speed of 75 to 100 rpm. The diameter of the trowels is only 34 inches, and that of the guard ring 35 inches, to permit operation in crowded areas and around obstructions. The light weight of the unit makes it easily portable about the job, and also permits an earlier start on the floating operation, the manufacturer reports.

Copies of a new bulletin on the Whiteman Model J finisher may be secured by those interested direct from the manufacturer by referring to this item.

Michigan Aids Local Agencies in Planning

The Michigan state legislature has approved an act, effective March 8, 1944, earmarking $5,000,000 from the state's general fund to assist local units of government in the preparation of detailed public works plans, according to an item in a recent issue of *News Letter*, published by the American Public Works Association. Of the total sum, $3,000,000 is to be available to cities, villages, counties and school districts, on a population basis, to plan a variety of improvements, facilities and services, and another matching $1,000,000 will be allocated to cities, villages and townships, on the same basis of distribution, for street and public improvement projects. County road commissions are to receive $1,000,000 for road, bridge, and grade separation plans.

This state-aid plan provides that the state will carry one-half the cost of plan preparation for local improvements, the money to be disbursed by the state administrative board on application from counties, cities, villages, townships and school districts. Rules formulated by the Michigan State Plan Commission and the State Highway Commission stipulate that one-third of the state's share will be paid to the local agency when the project is first approved, one-third when completed plans are approved, and one-third when local accounts are audited. If the state funds are not committed, as specified, to the various agencies by November 1, 1944, the uncommitted portion of the several allotments may be allocated, and any balance remaining in the $5,000,000 appropriation on June 30, 1945, reverts to the general state fund. The statute provides for joint participation by various local agencies in the preparation of plans for improvements where two or more units are involved.

Favorable legislative action on state-aid in Michigan is largely the result of the efforts of a special committee of public works officials, headed by Glenn C. Richards of Detroit, which has been active in promoting the plan.

Skilsaw Promotes DeWolf

Announcement has been received of the appointment of Delmar DeWolf as Advertising Manager of Skilsaw, Inc., Chicago, Ill., maker of saws and woodworking machinery. For the past three years Mr. DeWolf has served as Assistant Advertising Manager as well as Editor of the company's publication, the *Skilsaw Blade*.

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Protection when you need it can save many man hours on the job. FULTEX Waterproof Tarpaulins and Covers are well known and widely used. They have proven their quality through heavy duty and long wear. You get your money's worth when you buy FULTEX.

Quick delivery from stock on standard size covers.

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Greater Yardage per Dollar

Hough Hydraulic Loaders on International wheeled tractors have stood the test of time. They have proved economical and speedy in handling dirt, sand, gravel, coal, snow and other bulk materials, handling greater yardage per dollar invested.

Road contractors use them for sub-grading, leveling, charging concrete mixers and black top machines, loading or spreading materials, trimming shoulders and borrow pit work, etc.

Highway departments use them for road maintenance, loading stone, sand and gravel, loading from pits, stock piles, etc.

Municipalities use them for street repairs, handling garbage, snow removal and loading, material handling and loading.

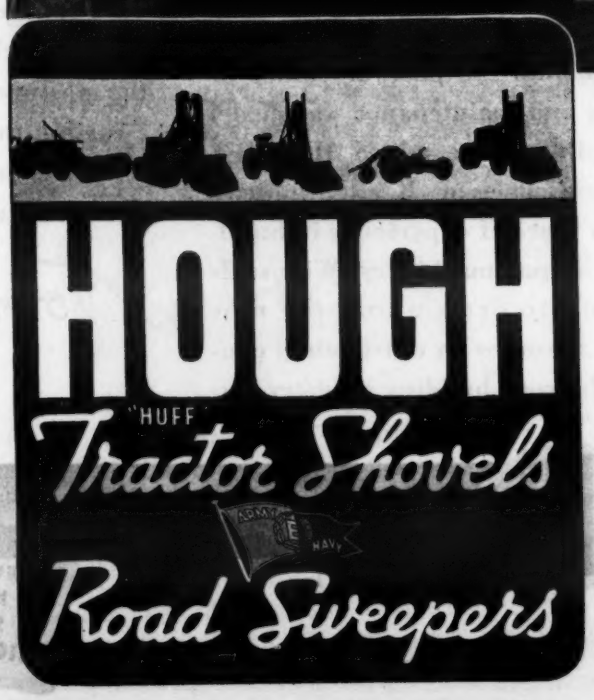
Nationally known users operate up to twenty Hough Tractor Loaders and the value of the many units employed in the war effort is attested to by our "E" flag. The Hough Hydraulic Loader on the International I-6 tractor pictured at the left is at work at a Southern Army post, where it is used for construction work, coal handling and clean-up work.

Ask your International Tractor distributor about the many unusual engineering, construction and operating details of these handy units.

THE FRANK G. HOUGH CO.

Libertyville, Illinois

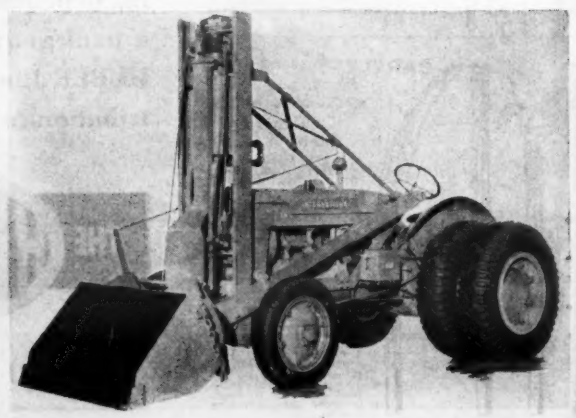
"Since 1920"



HOUGH

HUFF Tractor Shovels

Road Sweepers



Roadside Development In Virginia in 1944

Main Task Is Protection Of Roadside Investment; Seeding for Control of Erosion; Other Work

By H. J. NEALE, Landscape Engineer, Virginia Department of Highways

(*Photos on page 84*)

✦ ROADSIDE - development activities this year present mainly a problem of evaluation, to determine what order of priority should be given to the manifold tasks involved in roadside work. Our biggest job is to protect the roadside investments of the past decade so that they will more fully contribute their share to the war effort and at the same time reduce as much deferred work, to be done after the war, as is practicable.

The elements are not at all considerate of the shortage of man-power and equipment which prevails throughout the country, and especially in the Old Dominion State, where there are many areas critically affected by the war. The entire eastern area of the state is alive with war industries, Army camps, airfields, and Naval bases, and the highways are taxed to their capacity in transporting men and matériel from one area to another. Not only are the pavements in these areas being pounded to the breaking point, but slope erosion, ditch and shoulder scouring are persistent and pernicious. Weeds and insects are also on the alert to take over and undo the roadside-development work of many years.

All construction is virtually out for the duration, the only projects involving landscape operations at the present time being limited to those on access roads, and a few convict-camp projects. Practically all convict camps have been made available for highway maintenance operations.

It is a well-established fact that developed roadsides contribute materially to the protection and enhancement of the highway investment. Practically all roadside activities, and more especially ditch, shoulder and slope maintenance, are dependent on man-power and equipment, which are also needed to maintain road surfaces for the protection and safety of traffic. Many roadside activities which have been a part of our regular operations have had to be eliminated and others materially reduced. Only work which contributes to utility and safety, or which promotes permanent and lasting benefits, is considered essential at the present time.

Care of Ditches

Deferred maintenance operations, due to labor shortages, have resulted in many miles of scoured ditches and eroding shoulders. When these shoulders are regraded, temporary baffles of brush or logs are installed in the ditches to reduce further scouring.

In more critical places, soil-cement-stabilized gutters, surface-treated with bituminous material, have been installed with very good results. Every conceivable temporary device is being used to meet the situation with the labor and equipment available.

Shoulders and Slopes

Before mowing schedules are approved, a careful study is made, based primarily on three essentials: (1) The promotion and maintenance of adequate drainage and safety; (2) The prevention of the spread of noxious weeds, especially through the many agricultural areas; (3) The promotion of stooling or spreading of permanent grasses in recently seeded areas.

Surface erosion that undermines loose sod and silts gutters can best be eliminated by closely knit sod. Grasses which normally grow low and compact are being selected for their permanency. Once these low-growing grasses are firmly established on a shoulder or slope, mowing operations are materially reduced and noxious weeds practically eliminated.

Erosion control by staking and mulching is a wartime expedient for roadsides in Virginia.

Since the labor shortage has prevailed, it has been impossible to con-

(*Continued on page 58*)

It's the EXTRA VALUES that Lower OPERATING COSTS!
THE real value in an off-the-road tire is determined by the extra strength and durability of its cord body. Its body must be strong and durable to withstand hard usage and still be in good condition for retreading.
The cord bodies of Firestone Off-the-Road tires are stronger because they are made of special high tensile cord, Gum-Dipped and specially processed for extra strength. Four extra tread plies cushion the body against impacts. The cord body is further protected by specially compounded, cut-resisting treads and double-thick sidewalls.
These are the simple facts underlying the lower operating costs of Firestone tires. They are being proved on off-the-highway jobs everywhere, every day.
Listen to the Voice of Firestone with Richard Crooks and the Firestone Symphony Orchestra, under the direction of Howard Barlow, Monday evenings, over N. B. C.
Copyright, 1944, The Firestone Tire & Rubber Co.
Firestone
OFF-THE-HIGHWAY TIRES

STERLING PUMPS
BUILD FOR DEFENSE with STERLING PUMPS HOISTS and LIGHT PLANTS
Simple, Dependable, Rugged . . . the choice of leading contractors everywhere. Write for literature and prices.
STERLING MACHINERY CORP.
405 13 Southwest Blvd Kansas City Mo

"Unusual Weather" On Calif. Paving Job

(*Continued from page 7*)

RD8 Caterpillar tractor with a LeTourneau bulldozer was used at the batching plant to switch cars and clean up the stockpiles.

Hauling was done by a fleet of trucks, averaging 100 in number, and of all descriptions, each hauling two or three of the 37-cubic-foot batches designed with a cement content of 6.4 sacks per cubic yard.

Heating and Delivery of Water

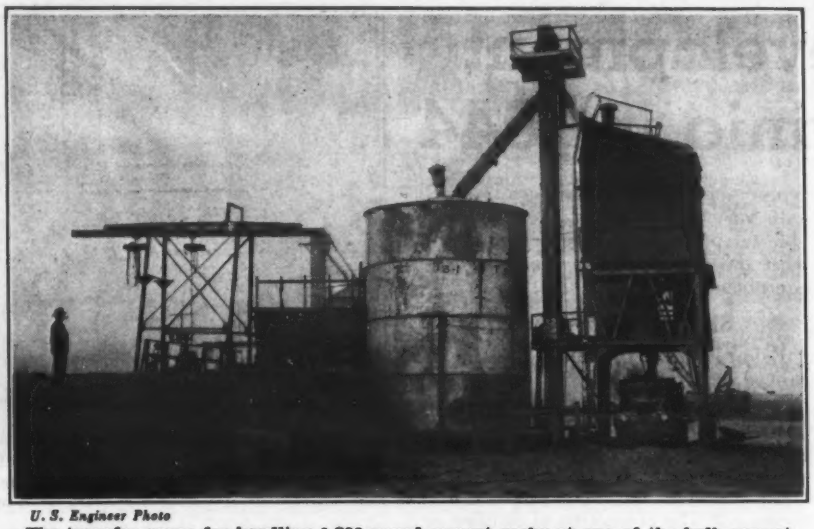
Since low temperatures were to be expected during the paving operations, provisions were made for heating all mixing water. Water from the mains of the Post distribution system was fed under its own pressure of approximately 70 pounds per square inch into two 40-hp horizontal boilers placed near the lower end of the contemplated improvement. Air from a 210-cubic-foot Ingersoll-Rand compressor fed fuel oil to the boilers in which the water from the mains was heated to a temperature varying between 120 and 180 degrees, dependent on the air temperature. A Union 6-stage pump powered by a Buda engine delivered the heated water to the contractor's distribution system at 160-pounds pressure. Four-inch boiler tubing fitted with Vitalic couplings was used for the distribution of the hot water, with 1½-inch tees and valves placed at approximately 100-foot intervals. The lines were not insulated nor buried since no extremely low temperatures were expected.

From Forms to Finishing

A crew of twenty to twenty-five men set and pulled the 12,000 feet of Blaw-Knox and Metaform steel forms which were distributed by a General Motors truck and crew of three men. Keys for the construction joints between adjacent 25-foot lanes were provided for by nailing properly formed wooden strips to the faces of the steel forms through nail holes drilled in the face of the forms.

The 9-inch uniform-thickness concrete pavement was poured in lanes 25 feet wide, varying in length due to construction conditions, with the average 1,500 feet and the maximum 2,000. A crew of twenty men made the final check of the fine grade after the forms were set, placed the 2-foot x ⅝-inch steel rods at 30-inch centers spanning the longitudinal dummy center joint, and placed the premoulded expansion joints at 120-foot intervals. Each asphalt-impregnated-felt expansion joint had ¾-inch dowels 18 inches long at 12-inch intervals. This work was kept well in advance of the placing of concrete, at least ten expansion joints being in place ahead at all times.

One man at the skip of each of the two



U. S. Engineer Photo

The transfer crane for handling 1,800-pound cement sacks at one of the bulk-cement batching plants on the Muroc Airfield paving job.

34-E pavers, a Rex and a Koehring, dumped the batch trucks while four puddlers assisted in spreading the concrete which was mixed with a water content of 5.5 gallons per sack of cement to provide a slump of 2 to 3 inches. During hours of low temperature, 2 per cent of calcium chloride was included in the mix. The pavers were placed on each side of the lane being poured and one man directed the trucks to whichever machine had the fewer waiting trucks at the moment.

Two Jaeger-Lakewood finishing machines, each equipped with two screeds and a tamper, spread and compacted the concrete and were followed by a Koehring Longitudinal Finisher. Metal drip pans were chained to the pavers to catch any drippings from the drum discharge and two men kept this grout shoveled from the pans onto the concrete, while four other men cleaned and spaded the pavement edges and threw concrete back to the finishing machines as needed.

Using checking straight-edges and long-handled floats, four men finished the surface while six additional finishers cut joints and edges. Grooves for the transverse dummy joints were cut at 15-

(*Concluded on next page*)

TYPICAL DIESEL LUBRICATION PROBLEMS:

2. Bearing Corrosion

The high speeds of automotive Diesel engines have increased the loads on bearings to such an extent that copper-lead and other alloy bearings are widely used. These bearings, although able to withstand far greater pressures and higher temperatures than the conventional babbitt type, are subject to corrosion.

These same conditions of pressure and temperature promote a reaction between the lubricating oil and the air in the crankcase. When a hydrocarbon lubricating oil is exposed to oxygen at elevated temperatures, the oxygen atoms combine with the oil molecules. With some lubricating oils, this reaction causes them to become corrosive.

The products formed in this reaction tend to dissolve the lead in the copper-lead structure of the bearing, leaving a porous copper shell which breaks down under pressure.

This tendency, which presents a serious problem to operators of high-speed Diesels, can be entirely overcome through use of RPM DELO in accordance with the recommended procedure.

RPM DELO, in addition to its other properties, prevents bearing corrosion in three separate ways:

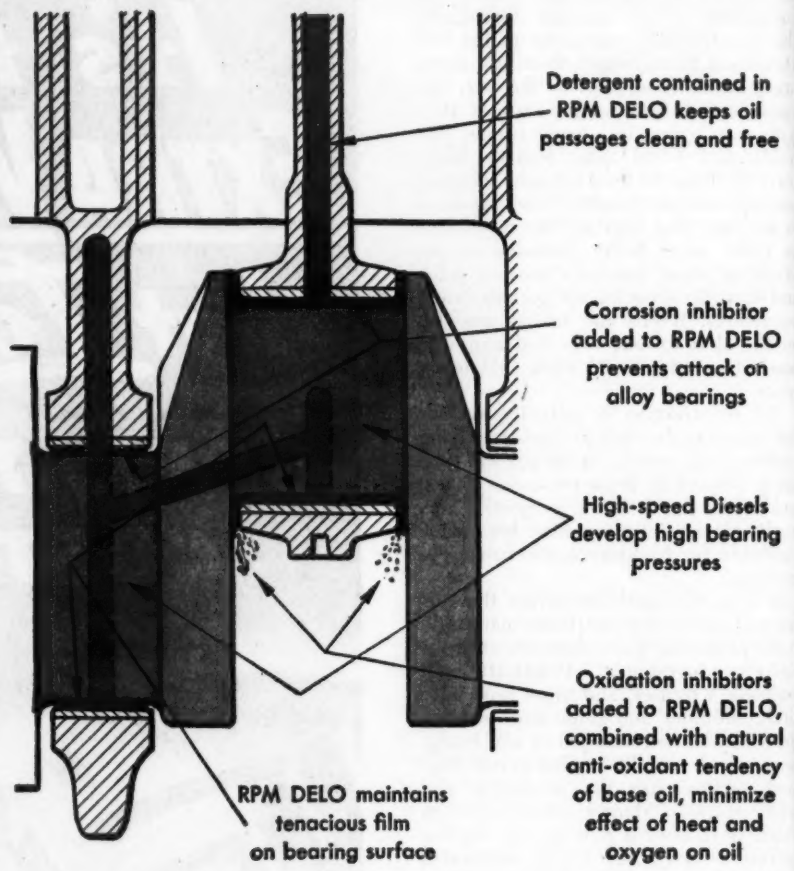
1. The base stock of RPM DELO contains natural inhibitors which are highly resistant to oxygen, and minimize the original tendency of all mineral oils to oxidize under heavy-duty conditions.

2. A powerful oxidation inhibitor is added to RPM DELO, which further reduces the rate at which the oil absorbes oxygen.

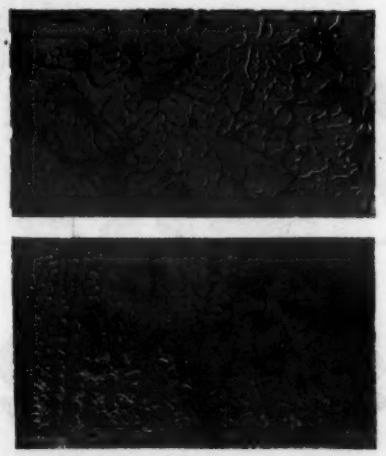
3. Direct protection is given to the bearing by the corrosion inhibitor added to RPM DELO.

Even more important than its non-corrosive property, is the ability of RPM DELO to eliminate ring-sticking, prevent excessive deposits on rings and ports, and minimize ring and cylinder wear.

RPM DELO has world-wide distribution and is marketed under the following names: RPM DELO, Caltex RPM DELO, Kyso RPM DELO, Signal RPM DELO, Sohio RPM DELO, and Imperial RPM DELO (concentrate). Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your vicinity.


Detergent contained in RPM DELO keeps oil passages clean and free
Corrosion inhibitor added to RPM DELO prevents attack on alloy bearings
High-speed Diesels develop high bearing pressures
Oxidation inhibitors added to RPM DELO, combined with natural anti-oxidant tendency of base oil, minimize effect of heat and oxygen on oil
RPM DELO maintains tenacious film on bearing surface

Diagrammatic sketch of connecting rod and crankshaft bearing assembly illustrates one section of engine where RPM DELO reduces overhaul and repair expense.



Top Photo: A photomicrographic cross-section shows the lead component of a new copper-lead bearing in light grey. The copper is shown as red. Note the even distribution throughout.

Bottom Photo: A similar cross-section corroded by use of straight, uncompounded mineral oil. Note how lead has been eaten from surface, leaving copper honeycomb.

RPM DELO

STANDARD OF CALIFORNIA

USE RIGHT BUCKET FOR THE JOB

Hayward makes all four—clamshell, dragline, electric motor, orange peel. A Hayward recommendation is unprejudiced.

—HAYCO—

THE HAYWARD CO., 32-36 Day St., New York

Hayward Buckets

Speedy Concreting At Western Airfield

(*Continued from preceding page*)

foot intervals by two men using long-handled grooving tools and a wooden guide made of 2 x 6 lumber which was laid on the surface of the pavement and acted as a bridge as well as a guide. A crew of eight men handled the two wooden bridges and the guide for cutting the longitudinal center dummy joint, cut this joint groove, and placed the ⅛ x 1½-inch division strip in the grooves for both transverse and longitudinal dummy joints. The heavy slotted metal cuff in which the premoulded expansion joints were set was pulled by two men before the concrete had attained its final set and replaced by a lighter cuff which extended only 1½ inches into the concrete but served to preserve the alignment of the joint until it had been edged.

At the end of each continuous run of 25-foot lane or at locations where it was necessary to leave a gap in the pavement because of incomplete work on underground utilities, the finishing machines were lifted and transported by a Browning truck crane on a Sterling truck. By using this expedient and having expansion joints and center steel set well in advance of concrete placing, the contractor was able to maintain an average production of 3,000 cubic yards or 12,000 square yards of concrete each 24 hours, during which period the pavers were in actual operation for approximately 20 hours. As many as ten 4-cubic-yard truck mixers were used at various times, with hand finishing crews, to mix and place pavement in the short gaps which had of necessity been left in the continuous runs.

Lights for night operations were provided by electric plants on each paver and the second finishing machine, with grouped reflectors directing the light advantageously. A Hobart arc welder mounted on a Ford truck which also carried tanks of oxygen and acetylene for a Smith welding torch was used for miscellaneous welding and cutting operations at the field.

Curing and Joint Pouring

Curing was accomplished by a crew of twelve men spreading 30/30/20 Weatherking paper furnished in rolls 3 feet wide and approximately 900 feet long over the completed pavement, unrolling the paper longitudinally down the slab, and covering it with 1 inch of sand from stockpiles which had been placed on both sides at 25-foot intervals.

A crew of eleven men handled the cleaning and pouring of joints, using a 105-cubic-foot Ingersoll-Rand compressor and air tools for joint cleaning. Asphalt for pouring was melted in a Standard Steel Works asphalt kettle and poured into the joints with hand pouring cans. A small portable Clark gasoline electric generator set of 1.5-kw capacity furnished light for the night crew who cleaned joints for the day crew but did no pouring.

Major Quantities and Personnel

In addition to many miscellaneous items of work on sub-surface utilities, the contract included the following:

Excavation	60,000 cu. yds.
Gravel base course, 6 inches thick	60,000 cu. yds.
Concrete pavement, 9 inches thick	230,000 sq. yds.
Tie-down anchors	2,400
Shoulder stabilization, road-mix	50,000 sq. yds.

The contract for the work was awarded on December 3, 1943, to Bressi & Bevanda and the United Concrete Pipe Co., both of Los Angeles, Calif., on their low bid of $1,300,000. Work was promptly started on December 5 with 30 working days allowed for completion.

Roscoe Downs was Project Manager and Joseph Muscolo, General Superintendent for the contractor. Sylvester J. Cook, Jr., was Area Engineer for the Los Angeles District, U. S. Engineer Department, under whose direction the work was done.

U. S. Engineer Photo
All joints in the concrete standing area at Muroc Airfield were poured by hand.

Mack Sales Appointments

New appointments in the Sales Department have been announced by the Mack-International Motor Truck Corp., Empire State Bldg., New York City. E. F. Vreeland, formerly District Manager for the Bronx and White Plains, N. Y., has been named Manager of the Albany, N. Y., branch in Mack's Northeastern Division. M. J. Chollet has been named District Manager of the St. Louis, Mo., branch, C. L. McLure becomes head of the Louisville, Ky., branch, and J. A. Briggs is the new Manager at Oklahoma City.

Searight Now Sole Owner Of Western Cataphote Co.

William H. Searight, Vice President of the Western Cataphote Co., Toledo, Ohio, has become sole owner of the business, with the purchase of the half interest held for years by Charles T. Harther, President. The company, which started as an affiliate of the Libbey Glass Co., was acquired in 1930 by Mr. Harther and Mr. Searight and its named changed to Western Cataphote Co. It manufactures reflecting markers for highway and other types of signs.

Why *PINOLA* Wood Preserver is Preferred

. . . It FILLS all sap pores of lumber with waterproof, rosinous matter.

. . . It HARDENS the lumber, preventing deterioration.

. . . It PENETRATES sap pores without heat or pressure.

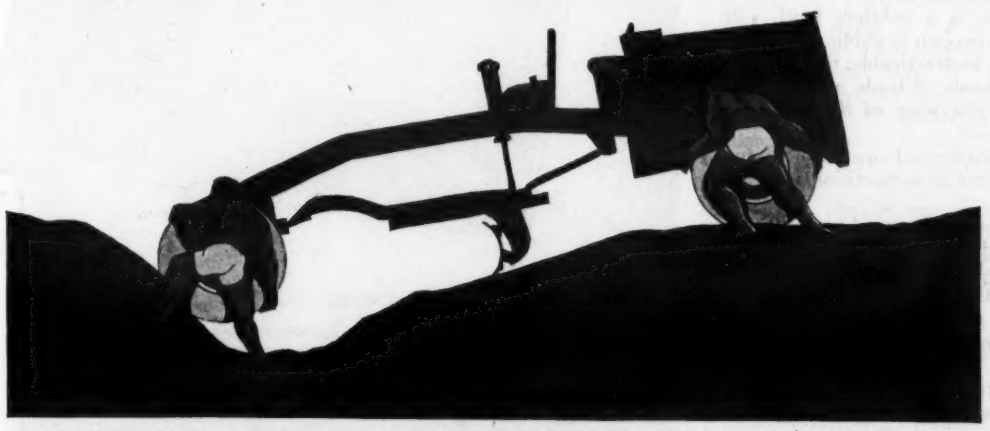
. . . Is NON-INJURIOUS to paints.

. . . Is NON-IRRITATING to the skin.

Lumber properly treated with *PINOLA* is the equivalent of Original Heart Pine. Twenty-six years of test prove it best. Every user of *PINOLA* is a booster. If your dealer cannot supply you write to us.

THE *PINOLA* COMPANY
Savannah, Georgia

On the ordinary Motor Grader, the front end is just that much dead weight which the rear end has to push around. The grader may be heavy, but *total weight* is not the measure of Motor Grader operating efficiency. What counts is the useful working weight carried on driving wheels; all other weight consumes power and is a definite handicap in many ways.



On the "99-M" Power Grader, there are no idling front wheels . . . no dead front end to consume power and decrease operating efficiency. All of the weight is on the driving wheels—front and rear—contributing 100% to traction; providing tremendous climbing power in the front drivers, and enabling the "99-M" to outperform all other Motor Graders, definitely and completely, on job after job.

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U. S. A.

Equipment Disposal Discussed at Meeting

Manufacturers Division, ARBA, Hear Govt. Representatives Discuss Plans For Surplus Construction Equipment After War; Industry Committee Formed

✦ THE Manufacturers Division of the American Road Builders' Association met in Washington, D. C., on May 10 to discuss recommendations for the disposal of surplus war construction equipment. E. R. Galvin, Sales Manager of R. G. LeTourneau, Inc., and President of the Manufacturers Division, opened the meeting and then turned it over to Charles M. Upham, Engineer-Director, ARBA, who introduced a number of speakers, including Major-General Philip B. Fleming, Administrator, Federal Works Agency; W. L. Clayton, Administrator, Surplus War Property Administration; Ernest L. Olrich, recently appointed Special Assistant to the Secretary of the Treasury to direct the sales of surplus property by the Treasury Department's Procurement Division; and C. E. Mack, Director, Procurement Division, U. S. Treasury.

An Overall Problem

While the immediate concern of the group was the distribution of surplus equipment and materials affecting the highway industry, Mr. Upham pointed out that, to solve the problem, it is vital that an overall view be taken of the entire situation, stating that if action is taken to give any one group an advantage, it would throw our entire national economy out of gear. In this connection he cited the ten broad policies recommended in the special report on War and Postwar Adjustment Policy prepared by Bernard M. Baruch and John M. Hancock. These are:

1. Sell as much as possible as early as possible without unduly disrupting normal trade.
2. Listen to pressure groups but act in the national interest.
3. No sales, no rentals to speculators; none to promoters.
4. Get fair market prices for the values, with proceeds of all sales going to reduce the national debt.
5. Sell as in a goldfish bowl, with records always open to public inspection.
6. As far as practicable, use the same regular channels of trade as in private business in disposing of the particular properties.
7. No Government operation of surplus war plants in competition with private industry.
8. No monopoly; equal access to surpluses for all businesses; preference to local ownership, but no subsidizing of one part of the country against another.
9. Scrap what must be scrapped but no deliberate destruction of useful property.
10. Before selling surplus equipment abroad, assure America's own productive efficiency on which our high wages and high living standards rest.

Construction Program Will Help

In his address, General Fleming pointed out that in normal times, construction activities contribute from 10 to 12 per cent of the national income, with public construction accounting for about one-third of such activities, and that we are not likely to have a very high level of economic activity in the future unless we have a pretty healthy construction industry. An important segment of the industry is the manufacture and sale of construction equipment.

To avoid a repetition of the disastrous fashion in which the surplus equipment problem was handled after World War I, General Fleming suggests two alternatives: we can sink the entire surplus in the Atlantic Ocean; or we can plan for a high enough level of construction after the war to put it to work and at the same time leave an ample market for additional equipment manufactured in the post-war years. We don't want any further willful destruction of wealth or property after this war, so the other alternative is to plan on using all our surplus equipment and more on useful construction projects, both public and private. General Fleming concluded with the statement that the Federal Works Agency has already been giving a good deal of thought to this whole problem of surplus equipment, and as a member of the Advisory Board of the Surplus War Properties Administration he would welcome the advice and suggestions of the construction equipment industry.

Present Plan

The present proposed plan for handling the disposition of surplus equipment and materials was outlined by W. L. Clayton. On February 19, 1944, the Surplus War Properties Administration was formed, to function as a policy-making body only. The administrative detail for the actual sale of surpluses will be handled by various agencies: capital goods will be disposed of by the Reconstruction Finance Corp.; consumer goods, in which category construction equipment has been placed, by the Procurement Division of the Treasury Department; ships by the War Shipping Administration; food by the War Food Administration, etc. It is expected that the same Industrial Advisory Committees which have aided the War Production Board in mobilizing industry for war will serve to advise in the problem of disposing of surplus equipment after the war. H. O. Penn, well-known construction equipment distributor, has already been appointed Construction Machinery Specialist to aid the Procurement Division of the Treasury Department.

Mr. Clayton defined the Administration's present broad policies as strongly opposed to dumping and also to dealing with speculators or special companies organized for the special purpose of handling surplus stocks. Insofar as possible, the equipment will be handled through the regular channels of trade. He feels that the government's getting the last penny of value for surplus stocks is secondary to maintaining a sound economy and to avoiding market depressions; he is also opposed to giving anything away.

Action Taken at Meeting

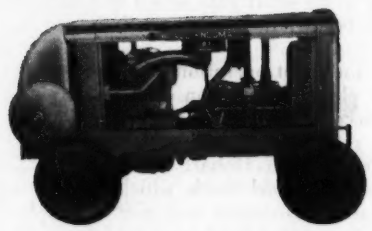
It was decided by the Manufacturers' Division to form a committee to represent the industry before government agencies. This committee would consist of members of the Board of Directors of the ARBA Manufacturers Division who are construction equipment manufacturers, with such others of the industry as they might invite to join them.

The general consensus was that real progress is being made in plans for disposal of surplus construction equipment, and that there is justification for optimism that this knotty problem will be handled without detriment to either the government agencies holding the surplus or to the industry.

Compare Your Equipment with

CP "Construction Equipment" (Catalog No. 600) describes and illustrates the advantages of using CP tools on your contracts. Efficient, dependable air compressors . . . low air consumption and low maintenance rock drills, concrete vibrators . . . clay spades . . . backfill tampers . . . time-saving wagon drills . . . these and many other items of money-saving equipment for contractors are described in Catalog No. 600.

Backing up Chicago Pneumatic's very complete line of contracting equipment are many years of successful, profitable use by contractors everywhere. Write for your copy of "CP Construction Equipment."

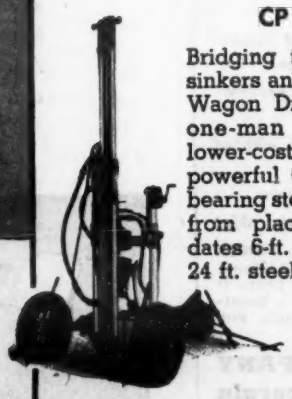


CP PORTABLE COMPRESSORS

Many refinements of design and manufacture give CP Two-Stage, Air-Cooled Portable Compressors exceptionally high efficiency and dependability. They are available with Hercules gasoline engines in sizes of 60, 105, 160, 210 and 315 c.f.m.; with Caterpillar Diesel engines in sizes of 105, 160, 210, 315 and 500 c.f.m.

CP SUMP PUMP

Removes water from manholes, ditches, tanks or pits quickly and cheaply. Requires no priming. Watertight casing; muck cannot get into motor. CP Sump Pumps will operate from any air compressor delivering 100 or more cubic feet per minute.



CP WAGON DRILL

Bridging the gap between hand sinkers and the Heavy Duty G-500 Wagon Drill, the G-200 provides one-man operation and faster, lower-cost drilling with the most powerful CP Drifter Drills. Roller bearing steel wheels; easily moved from place to place. Accommodates 6-ft. steel changes and 18 to 24 ft. steels are easily handled.

Secondary Road Fund Urged by County Engr.

Appearing for the American Road Builders' Association at the hearings of the House Roads Committee on the new Federal-Aid bill, Otto S. Hess, Engineer-Manager, Kent County Road Commission, Michigan, and Chairman, Postwar Highway Committee, County Highway Officials' Division, ARBA, stressed the importance of secondary roads and recommended an annual authorization of $250,000,000 to be definitely earmarked for county road improvement. Declaring that studies made by the ARBA indicate an accumulated volume of greatly needed county highway work immediately following the war amounting to approximately $4,000,000,000, Mr. Hess said that without substantial Federal assistance the counties would be unable even to approach the requirements.

Mr. Hess expressed dissatisfaction with the initial Federal-Aid secondary program and urged that a separate section of the bill be devoted to the subject of county road construction and that as much of the detail as possible relating to the subject be included in this section and not intermingled or confused with other features of the bill. Cautioning the committee against directives or blanket authorities, Mr. Hess concluded with the final plea that the Congress be as explicit as practicable in setting up legislation for local road construction.

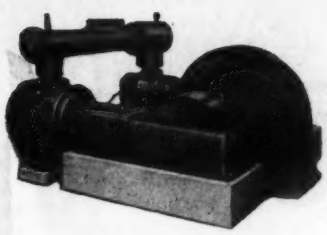
Universal Joints For Variety of Uses

The major purpose of a universal joint is to transmit power through an angle, effecting a connection between a driving and a driven shaft which are not in alignment. Such an out-of-line condition may be a simple angular situation such as would exist when the extended shafts would intersect, or it may be a misalignment which would arise when the extension of the shafts would not result in intersection. In the first case, a single universal joint compensates for the condition, while in the second a double joint or two-joint assembly is called for.

The line of Blood Brothers modern universal joints, which are simple, dependable, and economical, is described and illustrated in a catalog issued by the Blood Brothers Machine Co., Division of Standard Steel Spring Co., Allegan, Mich. These universal joints are described and shown in use in a variety of road building and construction equipment, such as leaning-wheel graders, rock crushers operated by a power take-off from a tractor, motor trucks, and many other applications. Among the types of universal joints made by this company are the N series needle bearing joint, the K series welded-type joint, the BW and the L12S series plain bearing joints, and the M series universal joint. Units for every standard application and for special applications are available.

Copies of this complete catalog may be secured by those interested direct from the manufacturer by referring to this item.

these CP Profit-Makers!



CP CLASS O-CE STATIONARY COMPRESSORS

Ruggedly built and conservatively rated, CP Class O-CE Horizontal-Duplex Motor-Driven Air Compressors meet every requirement of heavy duty, day-after-day service. Available in capacities up to 10,000 c.f.m. Other CP stationary compressors are available in vertical and horizontal designs for steam, belt and electric motor drive in wide variety of capacities and pressures.

CP 219 PNEUMATIC VIBRATOR

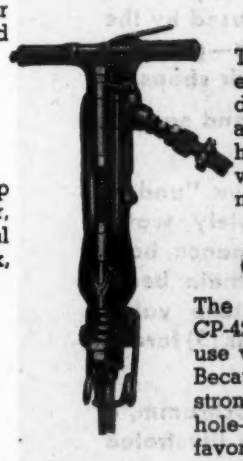
For light, reinforced concrete, 3" slump and over, there is no vibrator faster, cheaper to operate than the CP-219. Ideal for walls and columns under 15" thick, light floor and roof slabs.

CP 3 CLAY SPADE

Light in weight, fast, CP No. 3 Clay Spade is ideal for general digging in soft and medium clay. For digging in hard clay, shale, etc., CP No. 5 Clay Spade is recommended.

CP-MM BACKFILL TAMPER

In trench work particularly, CP Backfill Tampers quickly earn their cost by savin the time and labor of hauling surplus excavated material. For general tamping, CP-3 Tamper is recommended; for heavy tamping, CP-MM; for extremely heavy tamping, CP-4.



CP-117 DEMOLITION TOOL

The most popular demolition tool in the entire Chicago Pneumatic line. The CP-117 delivers a hard blow but it is so well balanced it has no kick-back and is easy to handle. Recommended for heavy duty work in hard, dense concrete and similar medium-to-extremely hard materials.

CP-42 SINKER DRILL

The low air consumption of CP-42 Sinker makes it ideal for use with portable compressors. Because of its fast drilling speed, strong rotation and exceptional hole-cleaning qualities it is a favorite drill for general excavation and road work.

PNEUMATIC TOOLS
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AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

Planning New Routes Aided by Aerial Maps

(*Continued from page 2*)

greatest possible advantage of scenic assets shown in the photographs.

5. To the Right-of-Way Engineer, air maps mean a great saving of time in his preliminary work because of the facility with which the proposed width can be related to the character of the land, its use, and the structures thereon.

Design and Landscape Objectives

The importance and the use of air surveys in the preliminary stages of design and location having thus been recognized, it is advantageous to consider what landscape objectives are sought with respect to the determination of a good centerline location. There should be coupled with the essential engineering requirements a location fulfilling the following landscape objectives:

1. Avoidance of excessive cuts and fills where possible, thus reducing the cost of landscape treatment and of annual highway maintenance.

2. Utilization of sites suitable for wayside parks, airfields, scenic outlooks and proper access to these and other recreational areas.

3. The conservation of existing vegetation and trees to the extent consistent with the engineering requirements.

4. Taking advantage of the natural lay of the land and of existing scenery within its range.

All these landscape objectives involve a careful coordination of work of the location and design engineers and the landscape architect during preliminary reconnaissance, in order that the most practical general route may be determined, taking advantage of the specific scenic factors. The utilitarian objectives will logically influence the design to determine a route somewhat shorter in distance or possibly of less difficult construction. However, the landscape objective might justify a somewhat longer route or a more difficult construction, if the scenic values seemed to the engineer and the landscape architect to offset the financial difference. This objective dictates a careful study of such opportunities as locating the route so a commanding view would make a lasting impression upon the traveling public.

The design of the location therefore should consider alternates, each possessing certain engineering or landscape advantages or disadvantages, and these alternate locations should be weighed from every angle during the reconnaissance stage.

No one factor can contribute more extensively to the preliminary consideration of such alternates and assist in a comparative appraisal as the study and use of air maps.

This article by Mr. Nichols is based on his report, as Chairman of the Committee on Roadside Design, before the Highway Research Board, November 27, 1943.

Determining Welding Preheating Temperatures

A new calculator, designed for readily determining the welding preheating and interpass temperatures of steels in those cases where experience indicates the need for preheating to obtain the best results, has been announced by the Lincoln Electric Co. manufacturer of arc welding equipment. This useful calculator is 6¼ inches in diameter and consists of four movable sections of heavy cardboard. Complete instructions in the form of six simple steps are printed on the outside sections.

The calculator may be secured direct from Lincoln Electric Co., Cleveland, Ohio. Price: 25 cents, postpaid, anywhere in the United States; 50 cents, elsewhere.

How Forest Service Cares for Equipment

Calif. Depots and Shops, Preventive Maintenance, And Rental Charges Keep Unit Costs Reasonable

Part I

✦ WITH approximately 3,000 pieces of construction and automotive equipment in grueling service in the National Forests of California, the U. S. Forest Service carries on an intelligently planned and carefully executed program of preventive maintenance encouraged by frequent field inspections, and careful repairs and replacements to extend the useful life of its machinery and rolling stock. Region 5 of the Forest Service, with headquarters in San Francisco, includes the seventeen national forests of California, containing 19,469,090 acres of federally owned land and 16,000 miles of roads, exclusive of approximately 2,500 miles of state-maintained highways within its boundaries. Since these roads are vital to fire-fighting operations, the responsibility for having them open and passable by June 1 of each year and repaired to standard by July 1 requires that road equipment be in first-class condition. This is accomplished by careful preventive maintenance. In addition to the equipment used in these forests, Region 5 has, during the war, maintained all equipment for the Guayule Emergency Rubber Project in California and that used by the Forest Service in Aircraft Warning Service activities.

Organized Equipment Service

Prior to 1935, each forest operated and maintained its own equipment much as it saw fit but the variation in methods and results indicated that a standardization program might prove beneficial. Standardized equipment service was established in 1936, with the use of equipment on a rental basis optional for the individual forests. By 1938 the benefits realized from standardization had become so apparent that the practice was made mandatory for all forests of the Region and has been in use since that time. While current procedures are based on present ideas of what is best, study continues, revisions are made periodically and there is no hidebound feeling of infallibility anywhere in the organization.

The Regional Office in San Francisco provides technical assistance, including the design of special equipment, and educational services. An assistant is assigned the task of keeping informed on the latest procedures developed by equipment and lubricant manufacturers, evaluating this information and digesting it, with recommendations, for the field forces engaged in maintenance. An example of this educational feature has been the preparation of a shop handbook containing maintenance and service information on various makes and models, including specialized and condensed data on shop procedures, which permit quick reference by shop personnel.

Actual repairs are done in the four Equipment Repair Depots, located at Arcadia, Salinas, Stockton and Redding, which are equipped and staffed to repair or rebuild any Forest Service equipment, or to construct any special units used only by the Forest Service. The organization has unofficially adopted the motto "If it's made by man, we can fix it". A forward-looking policy includes present planning for the upkeep of airplanes and helicopters which are expected to be most valuable to the Forest Service after the war.

Each Depot controls the operation of several branch shops which are equipped for necessary field checks and services, including the installations of assemblies, such as transmissions, differentials, and motors, which have been overhauled at the Depot shop.

Preventive Maintenance

The operator of each piece of Forest Service automotive equipment is responsible for its general condition at all times and is furnished with Form 97-R-5 "Preventive Maintenance Sheet A" to serve as a reminder of this responsibility and what it includes.

This sheet has space for the machine number, type, odometer reading, date and location, and lists the following items for checking:

	*Rating
"C" Service at proper intervals (last "C" Service: Date..... Mi.....)	7
"B" Service at proper intervals (last "B" Service: Date..... Mi.....)	7
Last previous "A" check (Date..... Mi.....)	
Chassis lubrication at proper intervals	7
Engine oil at proper level; oil changed at proper intervals	4
Oil filter properly maintained	2
Entries in 469-A Equipment Record Book properly kept	3
Air cleaner properly maintained	2
Water at proper level in radiator	2
Fan belt in good condition and working	1
Check for leaks (cooling system, fuel system, oil lines, differential and transmission)	1
Tires properly inflated (including spare)	6
Tire condition in accordance with safety requirements	2
Wheel lug nuts or bolts are tight	1
All lights working (both beams and stop light)	3
Safety reflectors, in good condition	1
Steering wheel free play—not to exceed 3 inches	1
Tie-rod straight (visual inspection)	2

(*Concluded on page 69*)

»» For HOSE BOOTS, CLOTHING or PUMP DIAPHRAGMS

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Immediate Delivery from Local Stock

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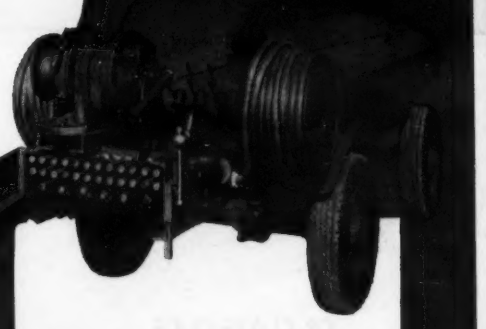
ERIE PENNSYLVANIA, U.S.A.

...Where UTILITIES use COMPRESSED AIR



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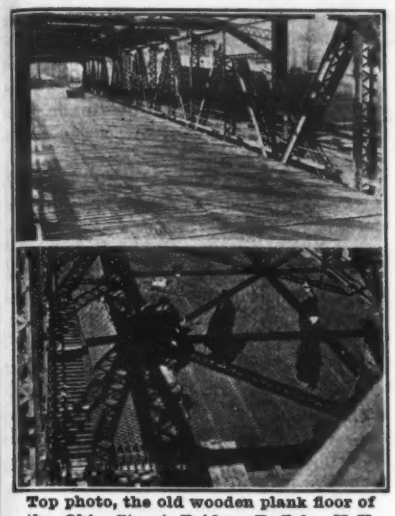
FIELD SERVICE
Digging post holes
Coating asphalt
Operating pneumatic drills and hammers
Paint Spraying
Tamping
Breaking pavements
Laying conduits and cables
Sandblasting for removing paint, cleaning, etc.
Wood boring
Picking ice from streets

STEAM PLANTS
Running, chipping, riveting and caulking hammer
Operating drills, reamers and flue cleaners
Supplying hoists, lifts and jacks
Removing scale, rust and paint by sandblasting

REPAIR SHOPS
Cleaning engines and machines by jets
Operating jacks, lifts and hoists
Running pneumatic hammers, drills, etc.
Operating brazing forges and smith fires
Supplying oil burners
Tire inflation

GENERATING STATIONS
Operation of air circuit breakers

SCHRAMM INC. THE COMPRESSOR PEOPLE WEST CHESTER PENNSYLVANIA



Top photo, the old wooden plank floor of the Ohio Street Bridge, Buffalo, N.Y. Lower photo, placing the last strip of Irving open steel mesh decking which has replaced the planking.

Steel Mesh Decking Renews Old Bridge

Until a couple of months ago the old Ohio Street Bridge in Buffalo, New York, was floored with wooden planks and was regarded as a definite traffic hazard. The city engineers decided to rehabilitate it and for the purpose chose steel mesh flooring, developed and manufactured by the Irving Subway Grating Co., Long Island City, N.Y. It was felt that this type of floor was not only economical, since it requires no maintenance, but adds greatly to traffic safety because of the non-skid qualities of the open mesh steel. After the old wooden planks were ripped up, the new material was laid in individual units, spliced together to form a continuous one-piece floor covering an area of 4,385 square feet. The job was done with practically no interruption to traffic.

This was the first use of open mesh steel decking as a bridge floor in Buffalo, although a bridge over the Buffalo Creek at Orchard Park was equipped with this type of decking several years ago, and another bridge over the Erie Canal at Lockport was the second in the world to be floored in this modern manner.

Engineers predict that when the post-war reconditioning of thousands of old bridges gets under way, open mesh steel decking will have a wide use in view of its economy and safety. Walter E. Irving, President of the Irving Subway Grating Co., said, "Its use will be a powerful factor in post-war employment. It will create countless jobs not only in the rebuilding of the bridges themselves, but in the steel industry, which should enjoy a peacetime boom".

Cleveland Tractor Promotes H. W. Davis

Announcement has been made of the appointment of H. W. Davis to the position of Assistant Industrial Sales Manager of the Cleveland Tractor Co., Cleveland, Ohio. Mr. Davis, who has been associated with Cletrac for over twenty years, started his career in the sales organization of his father, H. F. Davis, and later became head of the Sales Division of the H. F. Davis Tractor Co. In 1939 he was appointed District Sales Engineer for Cletrac in New York City, and for the past two years has been with the Sales Division at the home office in Cleveland.

Army-Navy "E" Awards

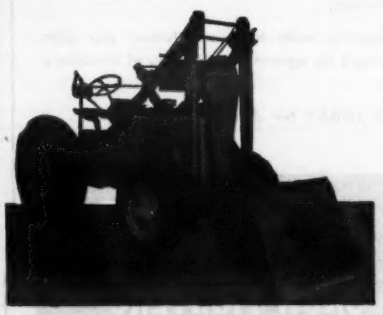
Several additional companies in the construction equipment field have received Army-Navy "E" Awards for excellence in production. These include the Buda Co., Harvey, Ill., which has been manufacturing diesel and gasoline engines, generator sets, fire pumps, lifting jacks, and various railroad equipment for both the Army and Navy; the Birmingham, Ala., plant of the Chicago Bridge & Iron Co., and the Dry Dock Yard operated by that company at Morgan City, La., for steel fabricated for LST ships or dry dock construction; the Construction Machinery Co., Waterloo, Iowa, which has been engaged chiefly in the manufacture of self-priming centrifugal pumps for the Navy, as well as concrete mixers, many of which are being sent overseas; and the San Francisco plant of the Link-Belt Co., Pacific Division, which is the fifth Link-Belt plant to be thus honored.

A star has been added to the Army-Navy "E" flag flying over the David White Co. plant at Milwaukee, Wis., for continued excellence in production of surveying and engineering instruments. Second stars have been awarded to the Continental Rubber Works, Erie, Pa., for its production of essential rubber products for the Army, Navy, Air Force, and Chemical Warfare Service; to the LaPlant-Choate Mfg. Co., of Cedar Rapids, Iowa, for its development and production of specialized construction equipment for use by the armed forces; and to the Victor Equipment Co., San Francisco. The award of second stars to the "E" flags of the three plants of Mack Trucks, Inc., at Plainfield and New Brunswick, N. J., and Allentown, Pa., brought that company's wartime production awards to nine Army and Navy citations within the past year and a half.

Dandie Mixers To Be Made by Kwik-Mix Co.

The manufacture and distribution of 7-S, 10-S and 14-S Koehring Dandie mixers have been turned over to the Kwik-Mix Concrete Mixer Co., Port Washington, Wis., a subsidiary of the Koehring Co. of Milwaukee, according to a recent announcement. This equipment will hereafter be designated as Kwik-Mix Dandie mixers, and all inquiries and requests for service should be directed to the new manufacturer, which also makes tilting and non-tilting 3½-S mixers, mortar mixers, plaster mixers and bituminous mixers.

The present distributor organization is expected to be considerably increased in anticipation of augmented post-war requirements, according to an announcement by the newly-appointed Sales Manager, A. E. Kelbe.



Front End Shovels
For Industrial Tractors
Write for Descriptive Circular
White Mfg. Co.
ELKHART INDIANA

ETNYRE U. S. PATENTED **SPRAY-BAR**

Attains Unequalled Efficiency in Application of Asphalt Cut-Backs, Tar, Road-Oils, Emulsion . . . In "Black-Topping"

NOTICE
about possible U. S. Patent infringement

At intervals, some "new" spray-bar is presented. Claims are made of how it will improve performance of an owner's distributor if he will buy and put one on his machine.

Etnyre, largest distributor manufacturer, has made more spray-bars than any other producer. Thousands are in use, having applied actually BILLIONS of gallons of asphalt, cut-backs, tar, road-oils and emulsion in YEARS of black-topping service.

Etnyre "Black-Topper" equipment is protected by U. S. Patents with other patents pending.

- **Sprays Any Width . . . up to 24 Feet or Wider**
- **Instant Start or Shut-Off at Every Nozzle**

Controls of entire spray-bar at operator's fingertip.

FULL CIRCULATION IN BAR . . . NO "FROZEN" ENDS . . . NO CONGEALED LIQUID

Replace Obsolete Spray-Bar On Your Distributor Now

Now is the time you should "modernize" your distributor—bring it up-to-date with an Etnyre Pat'd shut-off-at-nozzles spray-bar . . . and thus be ready to meet the rigid black topping specifications of Highway Engineers.

It is significant that Etnyre "Black-Topper" Distributors have been the preferred choice of road-contractors and engineers and officials in charge of highways, streets, and airports. Thousands of Etnyre Distributors are in use in the U.S.A. and other countries building better "black-top" at lower cost.

Etnyre pat'd spray-bar on YOUR distributor will pay for itself in a short time by better performance; faster and greater output.

Get in touch with your Etnyre dealer . . . or with us. Give full facts . . . model, year and size of your distributor.

The reason why the Etnyre "Black-Topper" is the most widely-used of all bituminous distributors is that it is the distributor which correctly coordinates FOUR FUNCTIONS SIMULTANEOUSLY—

1. **Heats liquid to proper temperature; maintains it.**
2. **Pumps liquid from tank directly to spray-bar.**
3. **Circulates liquid to and through the spray-bar.**
4. **Sprays liquid with precise accuracy and uniformity which may be varied from 1/10th gal. to 3 gals. per square yard . . . in widths to 24 feet, on flat surfaces, grades, and crowns.**

This liquid may be asphalt, cut-back, tar, road-oil or emulsion . . . from the heaviest to the lightest. It must penetrate, under proper pressure, into heavy aggregates . . . or a lighter application on gravel . . . or a finishing "seal coat." Each square yard applied with utmost uniformity . . . and each yard completely accurate as to amount.

Etnyre Pat'd spray-bars . . . as used by U. S. Engineers on hundreds of Etnyre "Black-Toppers" now in war service . . . make possible this performance, unequaled by any other distributor, or by any other spray-bar.

On the Etnyre pat'd "shut-off-at-nozzles" spray-bar each nozzle may be stopped or started instantly . . . as many nozzles as desired may be used . . . any place along bar . . . to spray any width . . . any part of the surface. No bar need be removed. Ends fold up for transit. Get facts now from your Etnyre dealer or write directly to us. Get faster, better "black-topping" with an Etnyre.

ETNYRE *"Black-Toppers"*

The most-widely-used bituminous-materials distributors in the world

E. D. ETNYRE & CO. Founded 1898 **OREGON, ILL., U. S. A.** 173 Bent Street CAMBRIDGE, MASS.

New Road-Mix Surface Laid by State Forces

(*Continued from page 2*)

been worked for many years and is always renewed with an excellent grade of sand and gravel at each flood.

A fleet of twelve trucks was used for the longest haul from bar to road. At the pit they were loaded with bank-run material by a Lorain 40 dragline. The small amount of oversize material easily worked out in the blading operations on the road.

Road-Mixing

The sand-gravel was windrowed in piles down the middle of the roadway, 3 cubic yards to a pile, giving about 1¼ cubic feet of material per square yard of road. By placing the piles in the center of the road, traffic was divided, which is safer than pushing the traffic closer together as is the case when the piles are placed down the side. In the latter case also more material is lost onto the shoulder.

The piles were distributed into a uniform windrow on the center line of the road by two No. 12 Galion power graders. After a uniform windrow was secured, the material was spread fairly evenly about 18 feet wide and MC-3 applied at the rate of 1 gallon per square yard of roadway or about 0.80 gallon per cubic foot of material. The asphalt was applied only 16 feet wide to stay well on the aggregates. Immediately following the distributor, one grader started folding over about 5 feet toward the center on one side followed by the second grader folding over 5 feet on the opposite side. One more trip with each grader brought the combined materials to a windrow in the center again.

This windrow was cut and pulled over by successive trips of the graders until it was worked to one side or back to the center of the road, where it was left for one to two weeks to cure. Mixing was then continued back and forth across the roadway until the asphalt and aggregates were fully mixed. In case of rain, the material was windrowed either at the side or the center to keep the water out of the mix and further working was delayed until all water had dried from the surface of the windrow and from the road.

The mixed windrow was finally spread across the road in small increments to give a uniform layer 20 feet wide. All of this work was done under traffic, there being no delays beyond a few minutes when a grader was working close to one side. After being spread, the material was rolled by an 8-ton Galion tandem roller and at times by a rubber-tire roller. This gave a compacted mat 1¼ inches thick. The edges were hand-trimmed for line after the final rolling, and the surface of the road-mix mat was covered with hand-cast sand, No. 40 and smaller, broomed uniformly over the surface and allowed to be rolled in by traffic. This further seals the surface and increases the density of the wearing course.

An extraction of a sample of the road-mix at the Highway Department Laboratory in Montgomery showed 5.4 per cent bitumen in the completed pavement while the actual bitumen plus flux was 5.75 per cent of the dry aggregate by weight. The cost of the new mat was 17 cents per square yard.

In this type of work, placing the asphalt in two applications instead of one and staggering the joints made by the shots on the two applications gives a more even distribution of bitumen. This is absolutely necessary on steep grades or superelevated curves, as the asphalt will puddle and run off the road otherwise. When asphalt is placed in two applications, the material is spread 18 feet wide a second time immediately after being windrowed behind the first application, the second application is made, and then the material is worked as described for a single application.

Personnel

This work was done by maintenance forces from Division 3 of the Alabama Highway Department under the direction of S. J. Cumming, Division Engineer, with headquarters at Tuscaloosa, Ala., and using prison labor.

Synthetic Rubber Now Reclaimed for Reuse

Heretofore considered totally expendable because every known method of rubber reclamation used upon it had failed, synthetic rubber is now being salvaged for reuse in the national rubber program, as a result of scientific research and effort. Laboratory research was started shortly after the national synthetic rubber program began, as early estimates of the scrap situation showed that thousands of pounds of scrap, accumulated during the manufacture of synthetic rubber items, and manufacturing defects would be useless unless new methods of reclaiming were found.

Formulae applied to natural rubber for reclaim purposes failed to make the material plastic enough to start reclaiming processes with it; in fact, use of these methods showed that synthetic rubber hardened instead of softening. New formulae were compounded, and test after test conducted, until processes were developed which have now made possible the reclaiming of this scrap material.

Thus far, more than 1,000,000 pounds have been reclaimed, and millions of pounds of used tires, tubes, treads, motor supports, belting, and scrap and mill overflow can now be salvaged and put to use. According to the scientists who have developed the new formulae, synthetic rubber is relatively high in desirable properties after reclaiming. After the material is reprocessed, these millions of pounds will be returned to the national stockpile, which will aid in alleviating the critical situation resulting from the present rubber shortage.

The research and laboratory work which has made possible this synthetic rubber reclaim program were conducted at the Naugatuck Chemical Division, United States Rubber Co., at Naugatuck, Conn.

Complete line of
gasoline, pneumatic and electric driven concrete vibrators and grinders
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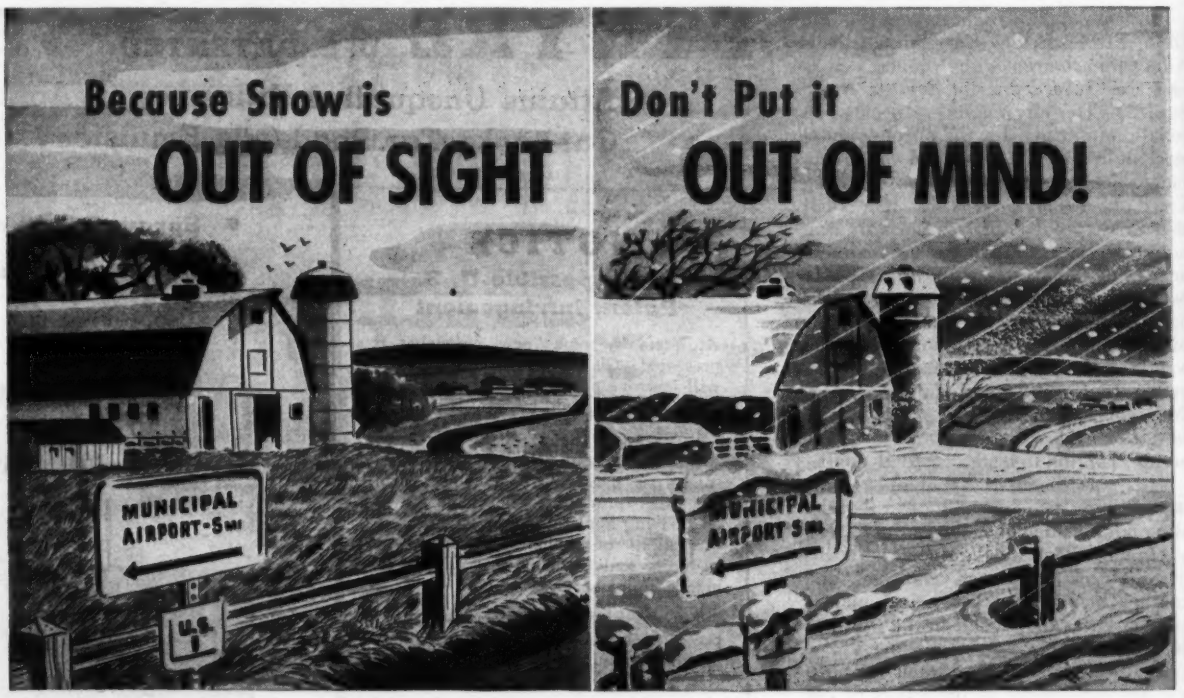

NOW is the time to Select Equipment for Next Winter's Snow Removal

Equipment "on order" will not keep your highways free of snow next winter! Yet, you may find yourself in exactly that position . . . if you wait too long to order the specialized snow removal equipment vital to winter highway maintenance.

Tackle the problem today! Figure your requirements in the light of last winter's experience and next winter's needs. Then get the facts on Walter Snow Fighters. Compare their engineering features and performance record with any other type of equipment.

Naturally, the restricted quantity of Walter Snow Fighters allotted for civilian use must be released on a "first come, first served" basis. Act NOW to assure delivery in time for the first snowstorm next winter.

Important Advantages of WALTER 250 H. P. SNOW FIGHTER

- Clears a 28 ft. width in one run—has rugged power to smash through road-blocking drifts, plus speed to clear more miles per hour.
- Throws snow far to the side—makes widening-out easier.
- Does not waste power in slipping, stalling or wheel-spinning, because the exclusive Walter 4-Point Positive Drive delivers power to each of FOUR driving wheels according to its traction at any instant.
- By clearing main highways faster, you gain extra time for opening more miles of secondary roads.

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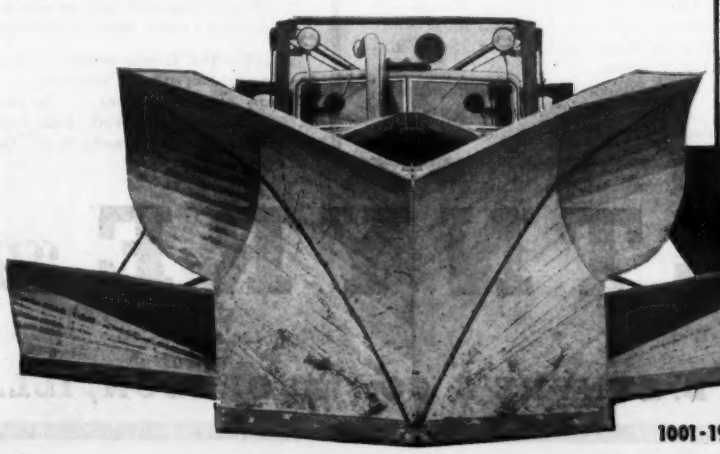

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Old and New Plans For Utah Highways

Retarded Development of State Highway System Can Be Overcome; Few Miles of Super-Highway Are Needed

By W. L. ANDERSON, Chief Design Engineer, State Road Commission of Utah

✦ DURING the past twenty-five years, Utah has developed a system of highways that has brought many benefits to the state. These roads have greatly reduced transportation costs, especially in areas not served by railroads, and for short hauls that are not economical for railroad transportation. They have permitted the opening up of new areas of agriculture, mining, and other raw materials. Good roads have greatly aided in the development of the educational system in the state by permitting transportation of pupils to central better-equipped and better-staffed schools.

Utah highways have also opened up some of the most beautiful scenery in the world for local and tourist recreational traffic. The scenic attraction has paid big dividends to the state financially in greatly increased tourist travel as well as aided in the welfare of the nation in permitting people to enjoy wonders of nature.

Also, there should be mentioned the great part that highways are performing in the war effort. The railroads are doing a fine job in the handling of transportation during wartime, but it must be kept in mind that this is possible only because the highways are taking the major portion of the short hauls, which would otherwise congest terminal facilities and overtax the railroads to a point where there would undoubtedly be a breakdown in the transportation system.

History of State Road Construction

In order to appreciate fully why the highway program in Utah has not kept pace with motor-vehicle development, it is well to look into the history of state road construction. No appreciable construction of all-weather highways was made in Utah until the issuance of the first state road bond issue of importance in 1917, and the beginning of the receipts from Federal Aid in 1919, following the initial appropriation in 1916. Practically all of the roads, including the road between Salt Lake City and Ogden, were impassable in wet weather. It was, therefore, the duty of the highway officials at that time to "get the automobile out of the mud". Since all roads were in this condition, it was not possible to expend much money for improvements of alignment and grade; rather it was necessary to place the major portion of the funds in surface treatment, which would permit all-year operation of the motor vehicle. Until this was accomplished on a fair portion of the major roads, most of the motor vehicles were left in the garage through the winter months and only operated during ideal weather conditions.

The State Road Commission was just beginning to see the end of this first phase of the program when they were immediately confronted with another problem. They had found that the motor vehicle had developed from one that moved 25 to 30 miles per hour to one that traveled at 40 to 60 miles per hour. Under these speeds the gravel roads, which for the sake of economy had been adopted over a major portion of the highways, had become so dusty and difficult to maintain that it was necessary to provide some remedy. Beginning in the late twenties and extending into the early thirties, a program of dust elimination by an inexpensive surface treatment was given to a large mileage of Utah highways.

After providing dustless all-weather surfaces over most of the main highways, a third construction period was entered wherein a similar development was made on important secondary roads, which took a large portion of the highway budget each year. The fourth period, started just before the present war, was a modernization program of many stretches of road which were extremely dangerous and nearly impossible to maintain under traffic conditions present at that time. The mileage constructed under this program was small, due to reduced Federal appropriations. During the years 1936 to 1940 inclusive, 40 per cent of the Utah construction program was for the reconstruction of roads previously improved with Federal Aid.

The policy of sacrificing quality for quantity, that is not building superhighways but building highways to serve the entire state, in past road construction has permitted highway transportation to function over the entire state, though admittedly not at maximum efficiency.

Since the war began, except for access-road construction which will generally serve only during war conditions, there has been no appreciable reconstruction program. During this period, there has been additional wear on Utah highways due to heavier imposed loads and, also, due to restrictions on labor and equipment, maintenance has been held to that which is absolutely essential. Therefore, the war to date has deferred highway improvement to an extent where at least $10,000,000 will be required to place the state roads in a condition they would have been in if a normal program had gone forward.

Standards of New Construction

In the past, Utah has, with few exceptions, been constructing highways not for present-day traffic, but for ten years ago. It is now hoped that sufficient funds will be made available for road construction so that, following the war, highways can be built not for present-day needs but for traffic needs for at least twenty years hence.

It is not the thought of the State Road Commission, nor probably of any of the

(*Continued on page 44*)

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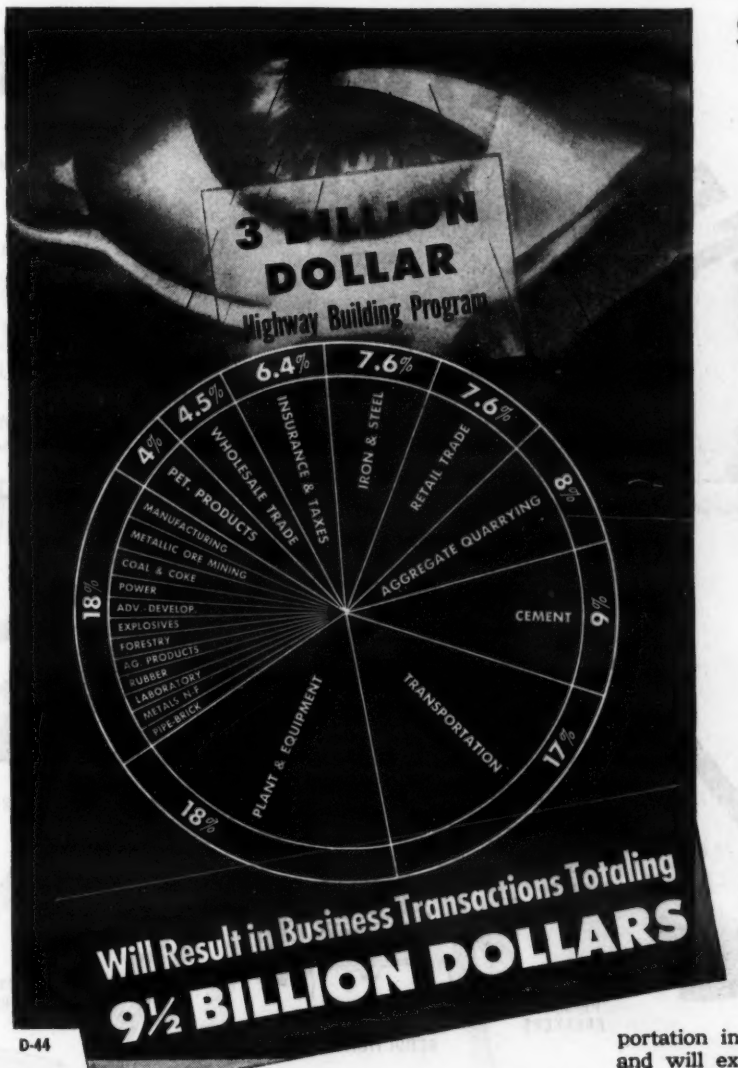

D-44

$s × $s = Worthwhile Jobs

Giant Stride to Keep Free Enterprise FREE

PROPOSED BY AMERICAN ROAD BUILDERS' ASSOCIATION

Even those who would destroy the American system of free enterprise must credit it with the greatest war production record the world has ever known.

But, that is not enough to keep free enterprise free. No segment of industry can afford to relax when the pressure of war is off. Nothing short of full employment will make freedom of enterprise secure through many difficult post-war years.

Because it is a basic and a giant stride toward this "must" goal, we urge all industry to get behind and push forward the planned peacetime program of the American Road Builders' Association.

It is sound because its proposed 3 billion dollar annual investment in highways multiplies to eventually result in business transactions totaling 9½ billion. (See chart above based on studies by U. S. Public Roads Administration.)

It is sound because it is capable of directly employing 3 million persons quickly and of contributing indirectly to the supporting of many more million jobs. (The highway transportation industry alone normally employs 7,000,000 and will expand with highway construction.)

It is sound because the economic structure of the country is built around the motor vehicle and will become more dependent upon it. Gasoline rationing forcibly brought this fact home.

It is sound because our highway system is inadequate, has suffered from heavy war traffic, weathering and limited maintenance.

It is sound because registration fees, gasoline taxes, municipal and county taxes, Federal user taxes, personal property taxes and tolls, if all used for highway purposes, would eventually be sufficient to build and maintain the highway system.

It is sound because it provides for competitive bids by contractors of experience. This insures higher efficiency, better construction at lower costs than can be obtained by the force account system of work relief.

The American Road Builders' Association, 1319 F St. N. W., Washington 4, D. C., has made a fourth printing of a 64-page book entitled "A Sound Plan for Postwar Roads and Jobs." We suggest that every American write for it—to the Association direct or to—

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The new Gar-Bro cable splicing rig.

Cable Splicing Rig Self-Contained Unit

Equally useful as a portable or as a permanent installation, the new Gar-Bro cable splicing rig is a structurally self-contained unit for handling all the necessary operations in the splicing of cable and is designed to increase the speed and efficiency of splicing, with a reduction in the physical effort involved.

For compactness in shipping and handling, the top and bottom members of the rig are detachable from the vertical member. The manufacturer states that the unit may be set up, bolted to a column or post, or lashed to a tree and be working in 10 minutes. Provision is made for mounting either vertically or horizontally by means of mounting pads. The overall size, set up, is 96 x 45 inches. Its total approximate weight is 250 pounds, but no section weighs more than 100 pounds. A perforated shelf mounted on the back of the splicing vise stand holds Marlin spikes and hand tools. Hooks are provided on the vertical member for other tools.

Any standard splicing vise may be attached to the stand which is supported by a ball-bearing revolving base. Directly above the splicing vise is a quick-opening jaw-type vise supported by a tension member. This gripping vise is rapidly actuated by spinning a large heavy-rimmed wheel. Any desired tension is put on the cable between the two vises by vertical adjustment of the tension member through a double-acting screw provided with a hand wheel. The cable is easily untwisted for splicing by revolving the splicing vise stand.

Further information on this Gar-Bro cable splicing rig may be secured direct from Garlinghouse Brothers, 2416 E. 16th St., Los Angeles 21, Calif.

Sales Promotion Mgr. Handles Advertising

American Chain & Cable Co., Inc., and Associate Companies, Bridgeport, Conn., have announced the appointment of Edward V. Creagh as Advertising and Sales Promotion Manager. Mr. Creagh joined the company in 1916 and his service has been continuous except during World War I when he was in the Army. He has been in charge of Sales Promotion activities since 1936. His new duties will cover newspaper, magazine, business publications, and other forms of advertising, in addition to sales promotion, including the wide variety of products made by the Associate Companies, which includes Weed tire chains, Tru-Lay preformed wire rope, Reading-Pratt & Cady valves, Page welding wire and chain-link fence, Wright hoists, Manley garage equipment, Owen springs, Campbell abrasive cutting machines, push-pull controls, Hazard wire rope, American industrial and hardware chain.

Engineering Safety Into Our Highways

Speaking before the Eno Foundation for Highway Traffic Control Meeting in New York City in April, H. G. Sours, Director, Ohio Department of Highways, discussed the responsibility of highway engineers and road builders for traffic operations, and outlined what is being done to engineer safety into our highways.

One of Mr. Sours' recommendations was a separate Bureau of Traffic and Safety for every highway department, which would include on its staff specialists in safety design who should review and prescribe safety treatment on all projects when they are in the preliminary stage of design. He pointed out that, while a progressive design bureau will always have some engineers well-trained in safety features of design, special treatment and special problems can best be suggested and handled by those who specialize in this field. All plans should be checked by a skilled traffic design engineer before completion.

Among the major items to be incorporated into design for safety on the highway, as outlined by Mr. Sours, are: widening of traffic lanes; multiple-lane pavements; the determination of safe sight distances and proper marking of non-passing sections; wide, flat surface-treated or grassed shoulders which can safely be used by traffic in emergencies; and limited access in urban areas to carry and distribute large volumes of traffic quickly and safely.

Blind spots, sharp horizontal and vertical curves should be corrected or carefully marked; guard rails installed on embankments, bridge approaches, and curves; proper signs and traffic striping are important to safety; and speedy and adequate snow removal and ice control play an important part in maintaining safe driving conditions during the winter months.

Mr. Sours concluded: "The highway engineer and the road builder are making and can make greater real and lasting contributions to the safety of our highways. The work of the enforcement and educational agencies must and will go on, regardless of what the highway engineer does. But the engineer and road builder, through proper design and maintenance, can and do contribute mightily to the elimination of the physical causes of accidents on the highway."

TELSMITH GRAVEL PLANT and QUARRY Equipment

When you modernize, expand or build a new plant—Telsmith machinery is the right answer to your production problems. From crushers to bin gates, every unit is designed, engineered, and built "right" *by Telsmith.* And Telsmith selective engineering service fits it to do the job you want done at the lowest operating cost. To push production to new peaks—buy Telsmith. Get Bulletin E-34.

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VULCAN TOOLS

A complete line for every type of Rock Drill, Pavement Breaker and Clay Digger.

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Dirt Ditch Checks That Do Not Erode

Great Lakes N. T. S. Protects Adjacent Private Property From Flash Flows Caused By Vast Impervious Area

(*Photo on page* 84)

✦ THE rapid expansion of the U. S. Naval Training Station at Great Lakes, Ill., which increased the buildings to well over 700, including new barracks, hospitals, drill halls and recreation centers, as well as the paving of hundreds of acres for drill grounds, multiplied manyfold the per cent of impervious area in the hundreds of acres at the Station. This speeded the run-off of storm water, some of which drains into small creeks flowing through draws or gullies in adjacent private grounds. These small flash floods heightened the erosion of the stream banks, causing some immediate failures and creating a condition of considerable potential damage. The authorities at the Station realized their responsibility for the condition and at once the Public Works Officer assigned a junior Civil Engineer Corps Officer to find the most economical solution which could be applied quickly.

Conditions in the Creek

In the one creek where conditions were the worst, the owners had built rubble-masonry checks about 1 foot high at intervals of 60 feet for a part of the length of the creek within their property. These were effective, attractive, but expensive. Below the existing checks, the gradient of the creek was 1.25 per cent and it was desired to reduce it to about 0.2 per cent by the construction of four additional checks or dams.

Since there is a small continuous flow of ground water through the creek, one would not usually consider earth checks, but the officer assigned to the task believed that adequately compacted local clay and soil, available along the creek banks, topped with fully compacted soil-cement as a spillway would be satisfactory. During the four months the dams have been completed they have fulfilled all requirements, with a small continuous flow and some half-dozen flood flows that topped the check dams by 8 to 12 inches for their full width for several hours at a time.

The Checks

With only casual labor available, the work was completed in remarkably short time. First a trench was hand-excavated around the site of the dam to by-pass the stream and temporary earth cofferdams thrown up. The area for the dam was then excavated to about 2 feet below the bed of the creek to a layer of heavy blue clay, almost a shale. The dam was built up to a height of 6 feet with a 2 to 1 slope up and downstream, using an A5 sticky yellow clay taken from the banks. The material was placed in 2-inch layers and compacted to 1 inch by five Thor pneumatic tampers driven by a 210-cubic-foot Ingersoll-Rand compressor mounted on a Dodge truck for mobility. The compaction secured gave an indicated saturated Proctor plastic needle penetration of 200 to 300 pounds per square inch, and was obtained by not more than two rounds with a pneumatic tamper over any one spot. This density of compaction was measured with a standard Proctor firm ram blow of one foot, not a free-drop blow. The material used had a placing cylinder needle of about 1,000 pounds per square inch. This placing needle value gives the most uniform structure and the density obtained is high enough to be practical.

A check dam with a soil-cement spillway installed in a gully through which water flows constantly. As shown, erosion has started at the toe of the fill, due to the fact that the soil-cement was not carried high enough in the trough conducting the water from the crest of the dam to the stream bed.

The Spillway

The top 12 inches of each dam was made of soil-cement, using the same A5 yellow clay mixed with cement in the ratio of one shovelful of cement to ten of clay. This was laid and compacted in the same manner as the earth dam and shaped to concentrate the continuous flow across the center of the dam in a space about 6 inches wide. The soil-cement mixture was handled at about a 1,000-pound-per-square-inch needle. If drier, it crumbled. The sides of this

(*Concluded on page* 55)

A STANDARD-LEWIS SUBGRADER EMBODIES MANY NEW AND EXCLUSIVE FEATURES

To meet the contractors' demands for lower subgrading costs and the engineers' exacting requirements for finished subgrade, our engineers have perfected the only subgrader embodying the exclusive features cited below.

Ready for production when the word is given, the Standard-Lewis Subgrader is the contractors' and engineers' dream.

FEATURES

1. Quickly adjustable to variable digging depth. 2. Cuts in either direction without turning. 3. Works around curves without binding and tows sideways through narrow places. 4. Digs right up to the header boards, eliminating hand cleaning. 5. Simple lever adjustment for spoiling at either side.

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Magnolia Building

AGC Branch Promotes Planning for the Future

Advertising and Publicity Campaign, Directed by Advertising Agency, Is Under Way in Carolinas

✦ AN interesting and constructive job of promoting present planning for useful post-war construction and of preserving the American free-enterprise system is being done by the Carolinas Branch of the Associated General Contractors of America. To do this public relations job, a committee, composed of C. P. Street, R. H. Pinnix, W. T. Adams, with Collier Cobb, Jr., a Past President of the chapter and the present head of the North Carolina State Planning Commission, and Frank H. Connor, Acting Executive Secretary, Carolinas Branch, was appointed. This committee enlisted the services of Harold C. Bennett, of Bennett-Advertising, High Point, N. C., to direct the publicity and advertising campaign, and set up a budget of approximately $25,000 for a twelve-month period.

Outline of Program

The idea prompting this entire undertaking is to range the construction industry alongside all other industry and business in its fight to preserve the American system of free competitive enterprise, to avoid a return to or need for a glorified WPA after the war, and to retain the contract system in public construction.

Specifically the plan is to:

1. Acquaint the public with the construction industry's accomplishments in war work.
2. Acquaint the public with the facilities of the construction industry to perform post-war work.
3. Promote the actual preparation of plans and specifications for needed worthwhile post-war projects.
4. Promote construction by private enterprise under accepted forms of contract as opposed to the day-labor method of work by governmental agencies.
5. Absorb a substantial part of post-war unemployment.

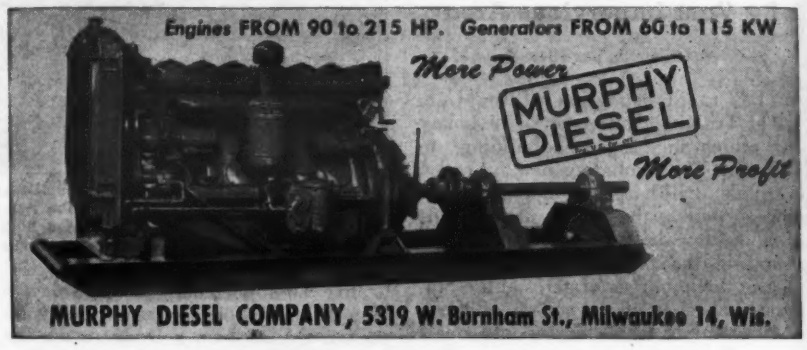
It was decided to tell this story to the public, to public officials, public-spirited citizens, in fact to all concerned, by every means and method practical. These include:

1. A newspaper advertising campaign embracing a series of advertisements in as many of the daily papers in North and South Carolina as the budget permits. This includes all of the principal dailies in the main towns.
2. A series of advertisements in state magazines, such as *The State, We The People,* and *Southern City.*
3. A series of especially prepared folders for local consumption, mailed to county commissioners, mayors, city councilmen, Chamber of Commerce secretaries, members of local planning boards, public works engineers, Boards of Education, women's clubs, city managers, and all state officials in both states.
4. A speaking tour, sponsored by the Association and featuring a well-known authority on the need for free enterprise to talk to civic clubs, chambers of commerce, and similar groups.

In an outline of this program sent to Branch members, it was stated that the reasons for such an activity at this time are:

1. The construction industry is expected to play a large part in reemployment after the war. If the industry is not prepared with plans and specifications to work on, it will not be able to make its contribution to post-war employment. Therefore, the industry itself must urge blueprint planning on the part of public officials and private business, to be done *now.*
2. Our present government administration might possibly see a welcome op-

(*Continued on page 60*)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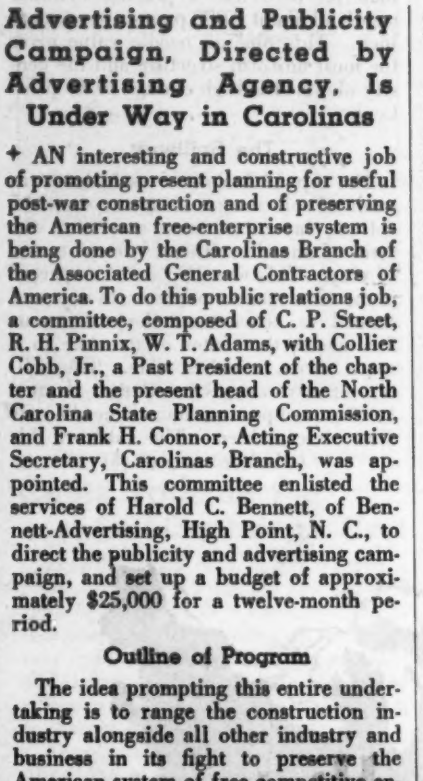


The first of a series of ads sponsored by the Carolinas Branch, AGC, and appearing in those states' daily papers.

PETTIBONE MULLIKEN CORPORATION
Established 1880
4700 West Division St.
Chicago 51, Illinois

Teeth set wide out at the corners of the lip enable PMCO Welded Dippers to take a wider bite that assures a fully loaded dipper.

This efficient wide set corner tooth location is possible only with a solid manganese steel front. The strain imposed by wide set corner teeth would break up a front of rolled sections or plain carbon steel.

Pettibone Mulliken engineers believe that efficiency in operation and strength in power shovel dippers should not be sacrificed by using cheaper materials to meet a price.

The new Syntron self-powered paving breaker and hammer.

New Demolition Tool Which Powers Itself

A new completely self-contained gasoline-engine-powered paving-breaker type of demolition tool has been announced by the Syntron Co., 227 Lexington Ave., Homer City, Pa. The main feature of this new tool is that it contains its own power and does not require an air compressor, fittings, or any other source of power or accessory. The manufacturer states that this new hammer is comparable in power to the larger-size compressed-air paving breakers, it is designed for easy operation by one man, and it uses moil points, chisels, frost wedges, clay spades, backfill tamping tools, asphalt cutters, sheeting drivers, and similar tools, all with 1⅛ x 6-inch shanks.

This new Syntron hammer consists of a 2-cycle gasoline engine in an inverted position, with two pistons, one an engine piston and one a hammer piston. The engine piston is connected to the crankshaft at the top of the hammer and drives the flywheel ignition magneto, and a fan for forced air cooling. Starting is by a rope pull. The free hammer piston acts as a movable cylinder head for the engine piston and, as the explosion occurs, is driven downward to strike directly on the shank of the tool being used, and then returned to the "up" or firing position, not by springs but by low-pressure exhaust gases. Throttle control of the blow permits placing the tool on the spot desired to be worked, without jumping around, the manufacturer reports. With a solid star drill, and using water to flush the cuttings out of the hole, the hammer will drill rock to a depth of 30 inches. The consumption of fuel, gasoline mixed with oil, is relatively low and the hammer is equipped with a fuel tank having a capacity for several hours' operation.

Further information on this new self-powered hammer may be secured by interested contractors and engineers direct from the manufacturer. Although the bulk of the production of these hammers is at present going to the armed forces, a few are available for shipment on high-priority orders, and there will be many applications for these units on post-war construction jobs.

WPB Lifts Ban on Alloy Steel in Road Machinery

The War Production Board has now adopted a policy of permitting a return to materials normally used in certain types of machinery if the supply situation warrants the change, if no additional labor will be required, and if the change will result in a better product. In line with this policy, the Board has revoked Schedules I, III and IV of Order 217 which prohibited the use of alloy steel in the manufacture of scrapers, trailbuilders, and bulldozers.

Schedule VI, which limited the manufacture of truck mixer-agitators to specified sizes and types, and also prohibited the use of metal in running-board platforms or drum guards except for supporting brackets, was also rescinded in so far as it applied to the use of metal. Limitations on sizes and types remain unchanged.

Bulletin Demonstrates Synthetic Tire Repair

The repair of synthetic tires and tubes will be simplified by the service bulletin on that subject which has just been made available by the B. F. Goodrich Co., Akron, Ohio. The book contains explicit directions for cold-patch tube repair for injuries up to ½ inch, vulcanized tube repair, and repairing and recapping of GR-S synthetic tires. Photographs showing correct procedures are included, as well as a curing chart for reinforced tube repairs. The book is approximately 8½ x 11 inches in size, already punched for insertion in a loose-leaf note book.

Copies of this useful bulletin may be secured by writing to the B. F. Goodrich Co., and mentioning this publication.

Ever Been Up Against
OOZE, MUCK, TRASH?

MARLOW "MUD HOG" diaphragm pumps will handle mud so heavy it could be shoveled . . . they'll take big hunks of trash without a quiver . . . they'll pump slow seepage or thousands of gallons per hour. Practically clog-proof; extra-rugged!

Ask your nearest Marlow distributor, or write for the free 80-page Marlow Pumpbook.

MARLOW PUMPS
Makers of the World's Largest Line of Contractors' Pumps
RIDGEWOOD NEW JERSEY

Cut Maintenance Costs and INCREASE PRODUCTION

● Here in one convenient book are charts, suggestions and part by part information that will enable even a new operator to keep Euclid hauling equipment operating efficiently for peak production. This 72-page handbook is profusely illustrated and presents detailed information on the proper servicing and operation of Euclids for longer life and better performance.

Today when present equipment must be kept in good working condition despite possible delay or difficulty in obtaining repair parts, you will find this new book especially helpful in making every operator a *better* operator. If you haven't received copies for your organization, ask your Euclid distributor to supply you or write our Service Department.

The EUCLID ROAD MACHINERY Co. · · · Cleveland 17, Ohio

EUCLID SELF-POWERED HAULING EQUIPMENT
For EARTH ROCK COAL ORE

AISC Engineer Resigns; Opens Consulting Office

The American Institute of Steel Construction has announced the resignation of F. H. Frankland as Director of Engineering of the Institute to begin private practice as a consulting engineer, with offices at 271 Madison Ave., New York City. Mr. Frankland has been associated with the Institute for sixteen years, and his engineering experience includes the design of important bridges, buildings and skyscrapers in the United States and South America, as well as river and harbor protection works, reservoirs and dams. The announcement states that he has been retained as consulting engineer for post-war public works in Suffolk County, Long Island, and on engineering research for a development company. He is also Chief Engineer of the North River Bridge Co.

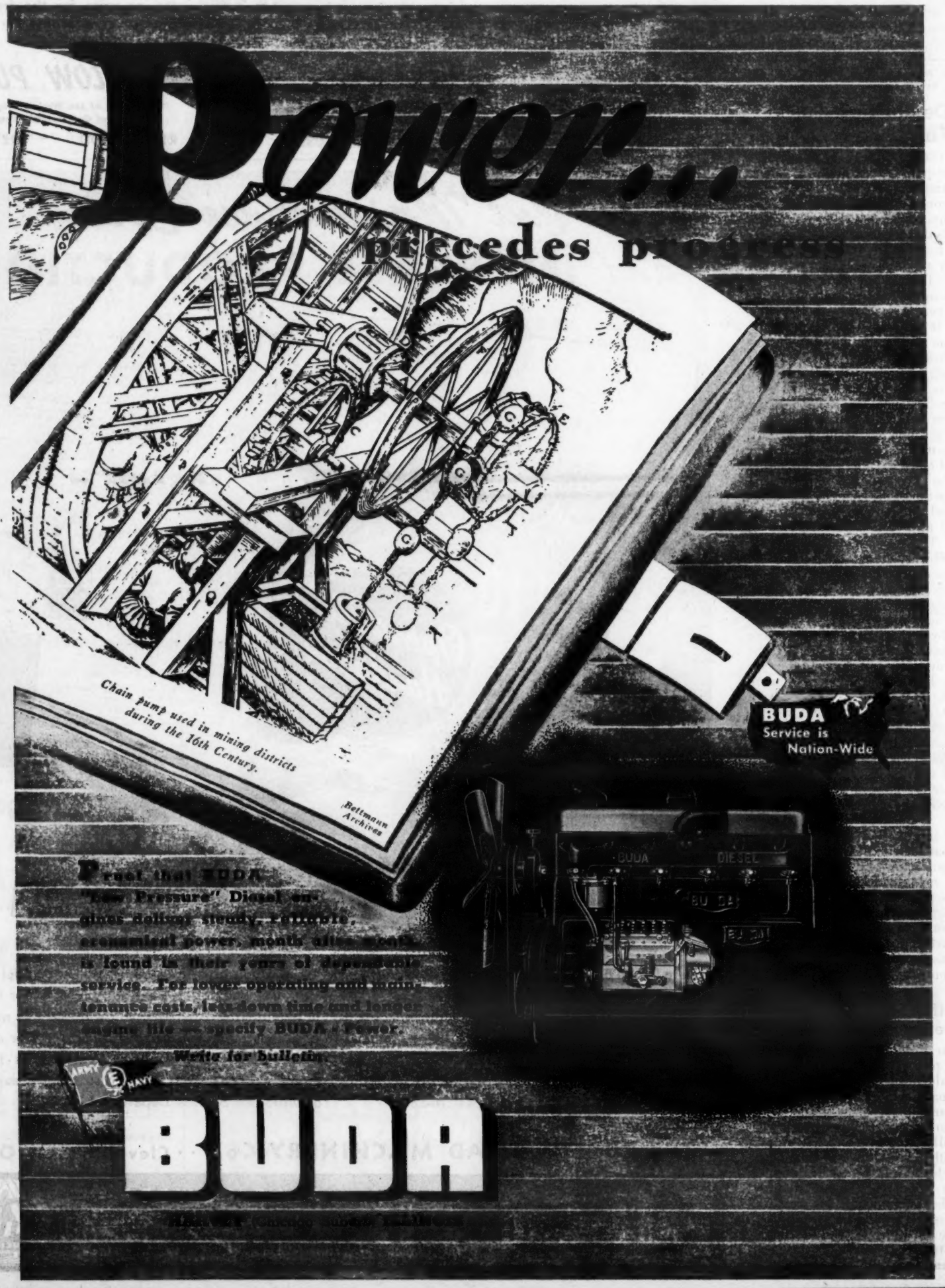
New Calculator Aids In Woodworking Problems

A new Handy Calculator designed to aid woodworkers by presenting in convenient form a variety of information helpful in working with wood is now available. By merely adjusting the dial, it is possible to convert linear to board feet, determine slope per foot in degrees, find comparative hardness, weights, shrinkage, warping, and ease of working of various woods. Bit sizes for head, body and thread of standard screws, nail specifications, and tips on tool sharpening are also included on this calculator, which is an accurate protractor as well.

Constructed of heavy varnished soil-proof cardboard, this Handy Calculator is 6 inches in diameter and fits easily into the tool kit. As long as the supply lasts, one of the Calculators may be secured for ten cents direct from the Greenlee Tool Co., Rockford, Ill.

District Representative Appointed by Reo Motors

The appointment of John M. Mathews as District Representative in Indiana and adjacent states has been announced by Reo Motors, Inc., of Lansing, Mich. Mr. Mathews has had wide experience in the production and distribution of motor trucks, his past activities having included service and branch management and extensive operation as a truck dealer. During the past twenty-two years he has been associated with the Indiana Truck Co., the White Motor Co. and General Motors Truck & Coach.


Power...
precedes p
Chain pump used in mining districts during the 16th Century.
Bettmann Archives
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Service is
Nation-Wide
BUDA DIESEL
Proof that BUDA "Low Pressure" Diesel engines deliver steady, reliable, economical power, month after month, is found in their years of dependable service. For lower operating and maintenance costs, less down time and longer engine life — specify BUDA Power.
Write for bulletin.
ARMY NAVY
BUDA

"Chats" or mine tailings being loaded by an International I-4 wheel tractor equipped with a ½-yard front-end shovel and owned by Cherokee County, Kansas. These chats are purchased at 5 cents a cubic yard and used in road building and maintenance. This tractor-loader outfit served three trucks carrying 3 yards per load and making eight trips per day of from 10 to 15 miles per haul.

Renegotiation Rules Clarified by Board

Although the Revenue Act of 1943 specifically exempts construction contracts awarded as a result of competitive bidding, any such general provision must necessarily be further amplified by rules and interpretations before the extent of its application can be determined. Several interpretations recently issued by the War Contracts Price Adjustment Board and dealing with the exemption of construction contracts from the renegotiation law follow:

"The provisions of subsection (c) (b) of the Act serve to exempt from renegotiation contractors or subcontractors whose aggregate receipts or accruals from contracts with the Departments and subcontracts as defined in the Act do not exceed $500,000 in any full fiscal year ending after June 30, 1943. No determination of excessive profits shall be made in any amount greater than that which, when deducted from such aggregate amount, will reduce it below $500,000.

"In the case of a fiscal year of less than 12 months, ending after June 30, 1943, this rule is applied on a pro-rated basis.

"The exclusion from renegotiation of construction contracts with a Department awarded as a result of competitive bidding applies only to contracts for the construction of buildings, structures, improvements and other similar facilities let to the lowest qualified bidder and which were entered into after advertisement and for which bids have been received from two or more independent, responsible and qualified contractors in actual competition with each other.

"This section of the Act is applicable only to amounts received or accrued under such contracts for fiscal years ending after June 30, 1943, and applies regardless of the date when the contracts were made.

"Contracts for the furnishing of materials or supplies or for the lease or sale of machinery or equipment are not deemed to be within the scope of this provision of the Act.

"The Board adopts the following discretionary exemption with respect to construction contracts entered into subsequent to June 30, 1943. The Board has found that competitive conditions affecting the making of construction contracts and subcontracts entered into subsequent to June 30, 1943, were such as to result in effective competition with respect to the contract or subcontract price where all of the following conditions exist:

(1) The contract or subcontract is one for the construction of buildings, structures, improvements or other similar facilities. Contracts and subcontracts for the furnishing of materials or supplies or for the lease or sale of machinery or equipment are not within the scope of this exemption.

(2) The contract was entered into subsequent to June 30, 1943, and did not constitute a substitute for or a revision or extension of an existing contract entered into on or before June 30, 1943.

(3) The work covered by the contract was substantially the same as the work for which the bids were requested.

(4) Bids were received from two or more responsible and qualified contractors, who were independent of each other and were in actual competition with each other for the work for which bids were requested.

(5) The contract price was not in excess of the low bid received.

"The Secretaries of the Departments to which the assignments for renegotiation are made are authorized to interpret and apply the exemption and to redelegate this authority and to authorize further redelegation."

The Fifth War Loan Drive is on! Buy a $100 War Bond today!

New Catalog Describes Line of Industrial Jacks

The Simplex line of lever, screw and hydraulic jacks, in sizes from 3 to 100-ton capacity and approved under Government Limitation Order L-322, is described and illustrated in a new 60-page catalog and manual, No. 44, issued by Templeton, Kenly & Co., 1020 So. Central Ave., Chicago 44, Ill. The catalog, which is handy pocket size, gives detailed descriptions, dimensions and capacities of hundreds of jacks, as well as proper operating and maintenance procedures. An index at the back of the book lists the jacks by types, which makes it easy to locate specific information, and the numerous illustrations include photographs showing jacks in use on construction, maintenance and repair jobs.

When the War Ends—

We will re-solicit your orders to make rapid, large-scale Aerial Surveys of

Highways, rivers, railroads, rights of ways, etc.

Until then we are engaged wholly on work for the Government.

CHICAGO AERIAL SURVEY COMPANY

332 South Michigan Ave. Chicago 4, Illinois

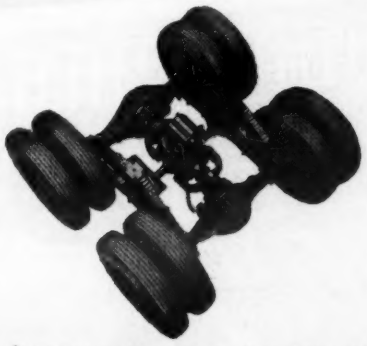
GET YOUR HEAVY DUTY TRUCK THIS SIMPLE WAY

Install a THORNTON FOUR REAR WHEEL DRIVE ON YOUR 1½-2 TON MEDIUM TRUCK

• New heavy duty trucks are very scarce, yet you need one badly to handle your hauling requirements.

Here's How You Get That Truck

Go to your nearest truck dealer and arrange to have a THORNTON Four-Rear-Wheel DRIVE installed. This will convert your new or used 1½-2 ton medium into a six-wheel, heavy duty truck . . . with two driving axles *under* the load . . . capable of hauling 100% more payload, climbing steeper grades, moving loads over bad ground conditions.



This is the THORNTON DRIVE, consisting of two driving axles; two-speed gear case assembly; "walking beam" type springs; wheels; tires.

THORNTON TANDEM CO.

8743-A GRINNELL AVENUE • Plaza 9700

DETROIT 13, MICHIGAN, U. S. A.

Investigate THORNTON Automatic-Locking DIFFERENTIAL for Replacement in Truck Axles

In Canada see: H. V. WELLES, LTD., Windsor

And the cost of your converted heavy duty truck is less than the original cost of a new heavy truck of the same capabilities.

HERE'S WHAT YOU DO

Write for complete facts. Send for free descriptive folders today.

TEAR OUT AND MAIL

Thornton Tandem Co.
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Please send me catalog of facts on changing my 1½-2 ton truck into a heavy duty truck.

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Address_____

City_____ State_____

Make of Truck_____ Year_____

Used for_____

Some Hints on Care Of Welder Generator

(*Continued from page* 10)

ditions may cause insulation to become less effective. If the insulation resistance fails too rapidly, it indicates that the set is being overloaded, operated in an excessively hot location, or is subject to other injurious conditions. If the trouble is not found and corrected, the life of the insulation will be greatly shortened.

At about the same time interval, or more frequently if the volume of work requires, the brushes should be checked and any worn ones replaced. The brushes for the generator and exciter are properly adjusted when the welding machine is shipped, and no particular attention is necessary to keep them in good condition. However, the brushes do wear out and when the "pigtail" leads are within ⅛-inch of the commutator or when they are so short that the brush fingers are no longer able to exert the proper pressure on the brushes, and thereby keep them in firm contact with the commutator, they must be replaced with new ones and, for best results, with the same kind of brushes originally furnished by the manufacturer. A complete set of new brushes should always be kept on hand. When new brushes are to be installed, they must first be sanded. This is accomplished by placing the new brush in position with a piece of medium sandpaper between the commutator and the brush. Never use emery cloth or an emery stone in touching up a commutator. A second person should hold the brush in its normal position with a slight pressure of the fingers. With the smooth side of the sandpaper held closely against the commutator, the sandpaper should be drawn back and forth under the brush, thus wearing the contact end of the brush down to the curve of the commutator. When this operation has been completed, all carbon dust and sand particles should be blown away from the commutator. At the same time, clean any dirt and dust from the brush holder, see that the brushes do not stick, and that the brush shunts are securely fastened. Also check the brush holder to see that it is the proper distance from the commutator, that the brush spring holds the brush firmly against the commutator, and that the spring moves freely. In general, the desirable brush pressure ranges from 1½ to 2 pounds, and this can easily be checked with a small spring scale.

The commutator should be cleaned with a lint-free cloth and, if grooved, should be turned down slightly on a lathe and the mica undercut, as describe later under "If You Run Into Trouble". It is very beneficial to burnish the commutator occasionally with a piece of heavy canvas applied forcibly with a stick by moving back and forth across the length of the commutator while the armature is running. This action also helps to remove abrasive particles that may be imbedded in the commutator surface. If the commutator shows a bluish or a reddish color, this indicates overheating, and the cause should be found and corrected.

Most welding machines are equipped with sealed ball bearings which are properly lubricated at the factory and which require no further greasing for anywhere from six months to several years, depending on the type of equipment and the amount of service it is called upon to render. However, it is well to check the bearings every six months and regrease them if necessary. As stated before, it is just as important not to overgrease them as it is to have them sufficiently greased. The manufacturer's instructions should be followed in this as in all matters of lubrication, and a high-grade ball-bearing grease should be used. Whenever it is necessary to remove the ball-bearing cap for inspection or lubrication, extreme care should be exercised to prevent dirt or other foreign particles from getting into the bearings.

During this quarterly check-up, look for damage to the welding studs from swinging welding cables, or by burning caused by poor connections. The welding-cable stud wing nut on the control panel should *not* be loosened by pulling on the cable, which has the effect of loosening the entire cable assembly. As a result the stud may heat excessively on the next job and perhaps completely burn out the insulators if the resistance causes more than ½-volt drop at this point. Inspect the starting switch and the welding leads for damaged insulation, exposed wire, and loose connections. Be sure that the leads are large enough to handle the welding currents being used, and that they are securely attached to the terminals. The frame of the set should be solidly grounded in accord-

(*Continued on next page*)

For Speedy heating of tar and asphalt—

Use this CONNERY oil-burning Patrol Patching Heater on the *small* job and this CONNERY oil-burning kettle for *large-quantity* production.

Write for catalog showing our full line of tar and asphalt heating kettles, spraying attachments, pouring pots, etc.

Connery Construction Co.

2nd and Luzerne Streets Philadelphia 40, Pa.

A WAR-PROVED FACT: As the war goes on, 300,000 Dodge-built Army trucks . . . and hundreds of thousands of Dodge Job-Rated trucks in essential home-front hauling . . . are emphatically establishing the fact that . . . IT'S A LONG WAY TO THE LAST MILE . . . OF A DEPENDABLE DODGE!

BUY WAR BONDS

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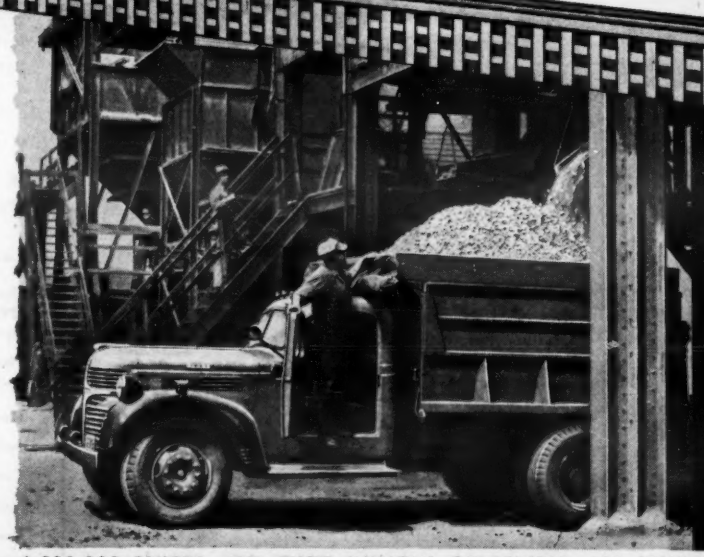
CARS AND TRUCKS . . . FACTORY ENGINEERED PARTS

TUNE IN MAJOR BOWES, CBS, THURS. 9 P. M. E.W.T.



DODGE *Job-Rated* TRUCKS

NEW TRUCKS AVAILABLE

The Government has authorized the production of a limited number of new Dodge Job-Rated trucks for civilian use in essential occupations. If wartime regulations permit you to buy, see your Dodge dealer for trucks to fit your job.

4,500,000 TRUCKS, AND THEIR MILLIONS OF DRIVERS, ARE SERVING AMERICA'S VITAL HOME FRONT!

Looking For Trouble Good Idea Sometimes

(*Continued from preceding page*)

ance with the National Electric Code. All internal electrical connections should be checked and made tight, as loose connections in the welding circuit will cause loss of current and consequent loss of heat. Also see that all bolts in the set are tight and that the air gaps are clean and uniform.

In gas-engine-driven welding sets it is important to keep the internal-combustion engines in good mechanical and electrical condition. Piston rings and valves, gaskets, spark plugs, ignition coil, condenser, distributor, and valve tappets should all be checked regularly to be sure that they are properly adjusted and functioning correctly. Also make sure that the lubricating oil in the crankcase is clean and of the correct viscosity for economy.

If You Run Into Trouble

If, in spite of careful set-up, supposedly proper operation, and regular careful maintenance, trouble does arise, as it sometimes does, here are some suggestions of what to look for and what to do.

If an electric-driven welder fails to start, first look for a disconnected switch, fuses removed from the clips, or blown fuses. Check the starter-switch holding coil which, if burnt out, must be replaced. Check the voltage, particularly at the moment of attempted starting, as the cause of the trouble may be that the power-line voltage is unsuitable for the driving motor or is extremely low. The cause may be that the machine is jammed somewhere, so see that the armature turns over easily by hand, and look for foreign material in the air gaps. Check to see that all fingers on the starter make contact when closed, and also that the relay contacts are closed and that the starter picks up when the push-button is pressed. If none of these reveal the cause of the difficulty, it's time for a service man.

If the welder starts but fails to generate, it may be that it is running the wrong way, so check the direction of rotation with the manufacturer's instructions. To reverse the direction, interchange any two of the power wires at the starter-switch terminals. Be sure that all brushes bear on the commutator and have the proper tension, check the exciter output voltage with a voltmeter or a lamp to see if the exciter is operating, and check for open circuits in the rheostat, field leads, field coils, and also check resistors and rectifiers.

It is possible that the generator has a reversed polarity, although this rarely happens. When it does, it is usually after shipment, and can be noted by the instruments reading in the wrong direction when the polarity switch is in the "straight" position. The remedy is to raise all the exciter brushes and connect two terminals of a storage battery to any two adjacent exciter brush-holders, passing current through the field coils for several seconds. If the desired results are not secured, reverse the connections and repeat the procedure.

If the generator fails to build up voltage, this is often due to the fact that the exciter is not getting any current through to the generator field coils. Check the exciter brushes first, also all connections at the reversing switch, and inspect the rheostat for possible burned-out coils. One of the exciter generator leads may be loose at the rocker arm. If the open-circuit generator voltage is lower than normal, first make sure that the armature is turning at the right speed by means of a reliable tachometer. If the unit is turning at the proper speed and the voltage is still low, look for a shorted generator or exciter field coil; this can be found by making voltage drop tests directly across the terminals of the coil. Sets with copper-oxide rectifiers supplying the excitation are likely to have a decreasing no-load voltage as these rectifiers age. This aging can be compensated for by adjusting a resistor provided for that purpose as outlined in the instruction leaflet with the equipment.

One ground within a generator will do no harm, but when there is more than one, it may develop into a "short" and make trouble. You can tell when the main generator is grounded by removing the ground cable assembly from the machine and then applying the electrode holder to some part of the welder frame; if there is an indication on the ammeter, it is grounded. Shorts in the generator or exciter field coils will cause a drop in the normal generator voltage; you can find the faulty coil by making voltage checks across the various coils and comparing them. The fact that a field coil

(*Continued on page 74*)

For More Uniform Compaction at Less Operating Expense—

INGRAM PNEUMATIC-TIRED ROLLERS

Oscillating axles—to insure uniform compaction
Short turning radius
Electric welding throughout
Low center of gravity—to prevent upsetting
Easily pulled by any medium-sized tractor
Ground pressure 60 to 350 pounds per inch of tire width

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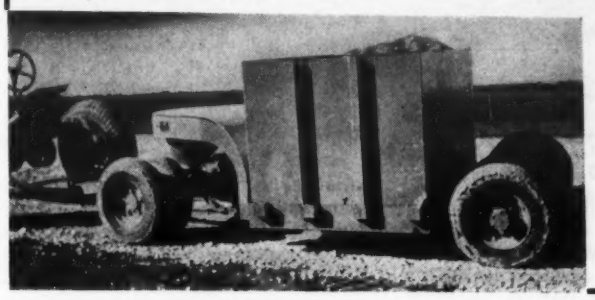

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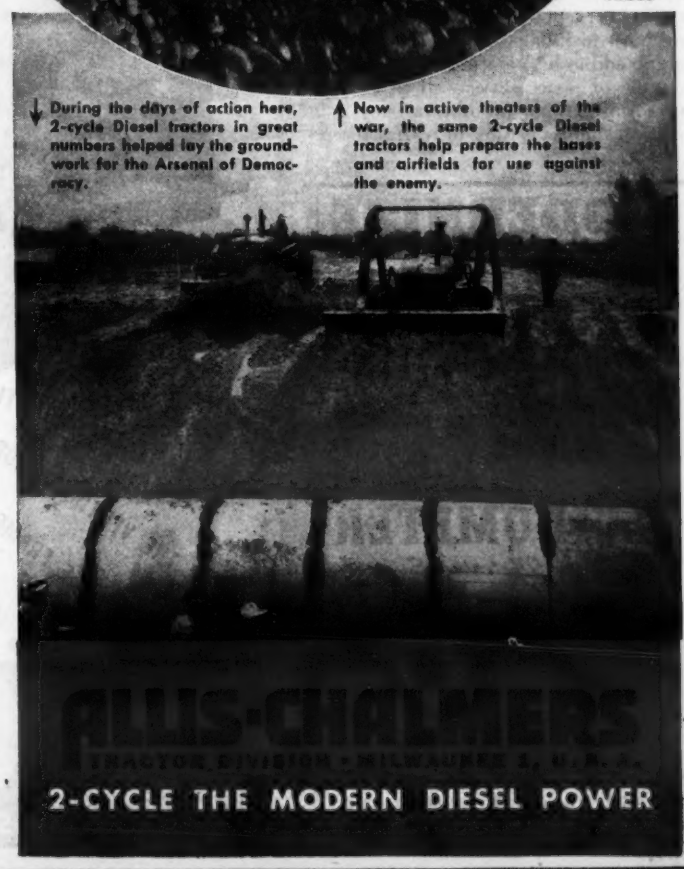
SAN ANTONIO 6, TEXAS

SIGNAL CORPS PHOTO

They're going big over there as they did over here! The same 2-cycle Diesel tractors that helped rush through the huge home front construction program the last few years are showing they still have plenty of service left . . . are now handling and licking even more difficult work for the Armed Forces overseas.

After tough day and night shifts on the big ordnance jobs here, they were put in tip-top operating condition in a hurry and shipped to distant areas of activity. Much of the overhauling was handled by Allis-Chalmers dealers whose skill, proper tools and genuine parts made A-1 repairs a certainty.

Now is the time to plan your future dirt-moving methods. Now is the time to investigate 2-cycle Diesel power . . . see what it will do for you! Why not talk it over with your Allis-Chalmers dealer! Write for literature.


During the days of action here, 2-cycle Diesel tractors in great numbers helped lay the groundwork for the Arsenal of Democracy.
Now in active theaters of the war, the same 2-cycle Diesel tractors help prepare the bases and airfields for use against the enemy.
ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U.S.A.
2-CYCLE THE MODERN DIESEL POWER

An air-operated clay digger removing clay around a penstock at a hydro-electric station.

Air Clay Digger Aids Repair to Pipe Lines

The urgent need for proper repair and maintenance of subsurface pipe is one of the vital wartime problems, in the solution of which construction equipment has played its part. In work of this type, the compressed-air clay digger can share with other modern construction tools the outstanding record which progressive contractors have established during a period when speed had to be maintained despite a shortage of manpower.

In addition to loosening gravel and other materials for loading, the pneumatic clay digger powered by a portable air compressor is a real time and labor-saving tool for cutting clay, hardpan and frozen ground for trenching and for the removal and repair of all kinds of underground pipe. Various types of spades, chisels and flat picks are available for operation with this tool, making possible faster work in all kinds of ground. When equipped with hard steel points, pneumatic diggers are suited to light and medium demolition work.

A wide variety of jobs can be done faster and more easily with a pneumatic clay digger, according to the Compressed Air Institute.

River, Harbor Work By Army Engineers

In a recent speech, Brigadier General J. S. Kingman, senior member of the Board of Engineers for Rivers and Harbors, U. S. Army, emphasized the importance of the Army Engineers' river and harbor work in increasing America's victory potential. "The works that are built to lighten the burdens of man and to add to his comforts and pleasures in time of peace serve well in time of war. And perhaps no other agency is in so favorable a position to realize the relationship of conservation work in war and in peace as the Corps of Engineers," General Kingman said.

Conceived during the Revolutionary War as a military agency to help "provide for the common defense", the Corps of Engineers was soon developed also as an agency to "promote the general welfare". For more than a century, the Army Engineers have been charged with the responsibility of developing and improving our waterways for navigation and, in recent years, also for flood control. The total volume of such work, over a period of more than 100 years, aggregates more than $3,000,000,000, and has provided thousands of miles of navigable inland waterways, and flood protection to vast areas of fertile and productive land.

During the supreme test of World War II, a test in which Axis aggression has challenged the productive ability of this country as well as its ability to move goods and materials in sufficient volume and on time, these peacetime works have in no small measure helped "to provide for the common defense", General Kingman said. Food and feed have been produced back of protective flood works, water transportation has expedited the flow of war goods by relieving our highways and railroads of vast tonnages of bulk freight, and improved inland waterways made possible the decentralization of our huge shipbuilding program.

In 1927, the Congress recognized the importance of past civil works of this type and the importance of more comprehensive plans for future development, and authorized surveys of the navigable rivers of the United States and their tributaries with a view to their most effective improvement for navigation, the control of floods, and the development of such other water uses as storage for power, irrigation, and domestic and industrial water supply. In 1935, these surveys were authorized to be supplemented by such additional study or investigation as the Chief of Engineers found necessary to take into account important changes in economic factors as they occur, and additional stream flow records, or other factual data.

General Kingman stated that reports have been made on more than 200 rivers, and the engineering and economic data have been compiled for a program involving some $4,000,000,000 of construction, a program which can be started at any time and prosecuted as rapidly as the Congress may deem it wise to direct.

New Vice President Of Raybestos-Manhattan

Robert B. Davis, General Manager of the Raybestos Division, Bridgeport, Conn., has been elected a Vice President of Raybestos-Manhattan, Inc. Mr. Davis joined the Raybestos organization in 1915 as a sales representative, was promoted to the position of Sales Manager in 1923, to General Sales Manager in 1932, and to General Manager in 1939.

MODERNIZE

YOUR ASPHALT PLANT by installing The FLUIDOMETER

Automatic Metering System

With a Fluidometer System, a push button replaces the weighing bucket routine. When the button is pushed the Fluidometer delivers the predetermined quantity, then automatically resets for the next delivery. Or it may be operated automatically by the mixer time lock. Paving mixtures are held to precise limits of uniformity—time and operating costs saved. Adaptable to all types of plants. Write for descriptive literature.

HETHERINGTON & BERNER INC.
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What is the Most Important Part of an Excavator?

IS IT THE SHIPPER SHAFT?
IS IT THE ASSEMBLY?
IS IT THE DRUM ASSEMBLY?
IS IT THE ENGINE?
IS IT THE DIPPER
IS IT THE MOUNTING?
IS IT THE VERTICAL PROPEL SHAFT?
IS IT THE FRAME ASSEMBLY?
IS IT THE REVOLVING FRAME?

BUCYRUS ERIE

● It is none of these and it's all of them.

There is no most important part. Every assembly, every smallest unit has its job to do. A loose bolt unattended to, a squealing band ignored, can easily result in complete stoppage of the machine.

That's why intelligent, preventive maintenance is so vitally necessary to keep your excavator digging at top speed all day long, day after day.

Careful inspection should be a regular routine. At least every six shifts (oftener in tough digging) inspect your machine completely. Be sure all nuts and cap-screws are tight.

Follow carefully your manufacturer's recommendations for care and maintenance. Lubricate regularly in accordance with instructions. Use only good lubricants. Keep oil and grease and fittings free from dirt or grit.

Watch the little things. Anticipate troubles; don't wait until they arise. Keep machine clean so you can see trouble start.

Time is precious. Your excavator has important work to do in this war we're fighting. Make sure it is kept in tip top fighting condition by giving it the best possible care constantly.

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN, U. S. A.

Temporary Controls Installed at Friant

Smaller Valves Borrowed From Boulder Dam Used To Start Water Storage And Put Canal in Service

(*Photos on page 84*)

✦ DURING the late autumn of 1943, the Utah Construction Co. of San Francisco undertook a cost-plus-a-fixed-fee contract for work at the Bureau of Reclamation's Friant Dam on the San Joaquin River approximately 20 miles north of Fresno, Calif. The contract included the installation of frames and guides for the upstream fixed-wheel gates, the plugging of temporarily unusable outlets, and the installation of three 84-inch needle valves borrowed from Boulder Dam. By this substitution, the Bureau of Reclamation was able to begin storage of water behind the dam, and assure its delivery to the Madera Canal upon completion of certain portions of that canal in the spring of 1944, despite the wartime restrictions placed on the manufacture and use of steel control appurtenances when the construction of the dam was completed in 1942.

Friant Dam, designed by the Bureau of Reclamation and constructed under contract, impounds the waters of the San Joaquin River, primarily for irrigation of the rich agricultural development in the Central Valley Project, with added value in controlling flood waters. Initial construction did not provide for the generation of electrical energy at Friant. It is a straight gravity-section concrete dam, the fourth largest in the world, rising 320 feet above the foundation and extending 3,430 feet from end to end at the top. The spillway crest is at Elev. 560 and drum gates will be installed, when available, to raise the level of the reservoir to Elev. 578. The 1,300,000 cubic yards of earth and rock excavation and the placing of the 2,200,000 cubic yards of concrete in the structure were completed by the Griffith Co. and Bent Co. between 1939 and the middle of 1942 but, because of the war and the critical steel shortage, it was impossible to obtain the necessary control structures at that time and storage of water could not be started.

Final plans provide for the maintenance of uniform flow in the lower reaches of the San Joaquin River and the delivery of 1,000 second-feet of irrigation water through the Madera Canal and 3,500 second-feet through the Friant-Kern Canal from the storage created by the dam. Since certain portions of the Madera Canal will be ready for the delivery of this water by the middle of 1944, it was considered essential to place this dam in service even though complete control structures are still not available and the following procedure was instituted.

1. The installation of steel frames and guides for the fixed-wheel gates used on the upstream side of all openings through the dam.

2. The temporary installation of three 84-inch needle valves borrowed from Boulder Dam, two to permit control of the river flow below the dam, and one to control the discharge into the Madera Canal.

3. Plugging temporarily the other openings through the dam for which downstream control units are not now available so that the water can be permitted to rise behind the dam.

Installation of Gate Guides

Because it was impossible to install the gate guides during the construction of the dam, slots for their later installation were left in the upstream face with protruding tie bars, and the installation of the steel guides in these slots had to be completed ahead of the rising water behind the dam. Since the water level had already risen 20 feet above the lowest elevation of the guides for the river-control openings at Elev. 360, it was nec-

(*Concluded on page 67*)

Bureau of Reclamation Photo

Hauling in a section of 84-inch needle valve for Friant Dam. The four river outlets, with two shut off for installation of valves, are seen in the background.

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THIS LOSS CAN BE PREVENTED with efficient, modern oil conditioning equipment that will help good oil do a thorough and continuous job of lubrication BY KEEPING IT CLEAN!

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Yes, this black, sticky, carbon and varnish besmudged piston with stuck rings IS CAUSING POWER SABOTAGE and waste of precious oil, gasoline and man hours. It was removed from an engine which was equipped with conventional type filter.

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Yes, this is the same piston as the dirty one shown above, after it had been replaced in the engine and driven approximately 250 hours with Winslow Replacement Elements being used as needed. It came out clean, free of varnish and carbon and with rings free.

Winslow Elements can clean up the inside of an engine in this way because they are specially treated with an acid-neutralizing and oil desludging agent.

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WINSLOW
OIL FILTERS • CONDITIONERS • ELEMENTS

Concrete and Block Paving Maintenance

(*Continued from page 14*)

cleaned, new material is poured into them in sufficient quantity so that they will be well sealed when the material has cooled. Thermometers are used to test the material during heating to see that it does not become too hot and that it is at the proper temperature when applied. Joints and cracks are never filled when the pavement is wet.

After joint material has been placed, it may be necessary with heavy traffic to cover the material with coarse dry sand to prevent picking up. If excessive material has been poured inadvertently, it is removed after it is cooled. Also, and this is a policy not followed by some states, any considerable amount of joint material which may be forced out of the joints during hot weather is removed from the surface.

When concrete slabs, or portions of them, sink or settle below their normal position, the method of correction in each case is determined by the Engineer of Highway Surfaces. If the slabs are cracked or are otherwise in poor condition, the normal procedure is to break out the pavement and replace it at the correct elevation. If the slabs are in good condition, they are lifted by Mud Jacks as described later in this article.

When concrete pavement buckles, or when slabs are elevated above their normal position, it is necessary to remove the slabs, or portions of them, and replace them with new material. In cases of buckling due to expansion of the concrete itself, a portion of the pavement is removed to give the remaining part an opportunity to settle back to its former position. If it does not return to its original place, it is removed. In replacing concrete in such a location, an expansion joint at least ½ inch wide is left between slabs.

In preparing for the replacement of concrete, old concrete is removed from the defective areas as well as from the surrounding pavement in sufficient quantity to insure that the repaired pavement will have the proper structural strength. If an expansion joint is less than 10 feet away from the edge of a defective area, all the concrete between the defective area and the expansion joint is removed as well as the concrete within the area. If the old pavement is reinforced, the length of reinforcement exposed for overlap with new reinforcing is equal to at least fifty times the diameter of the reinforcing rods, as is standard in concrete construction. Exposed reinforcing is thoroughly cleaned of concrete, rust and scale. If the pavement subgrade has been disturbed, it is restored to a well-compacted condition with a true and even surface at the correct elevation. Unsatisfactory subsoil is replaced with approved material.

New concrete used for pavement replacement is a standard Class A concrete. If truck-mixed concrete is used, all the truck mixers must have been approved by the Bureau of Engineering Materials, and no water may be added to the aggregate until the trucks arrive on the project.

When concrete pavement is badly cracked, broken, spalled, or otherwise in need of extensive repairs, the use of new concrete is not considered economical. Standard bituminous surface treatment, stone surface treatment, or skin patching with dense mixed bituminous concrete is used when authorized by the Engineer of Highway Surfaces.

Block Pavements

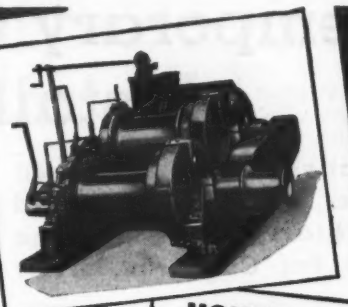
Every endeavor is put forth to keep the surface of block pavements smooth and sealed to prevent water from getting between the surface and the base courses. When these pavements become defective due to excessive wear, settling or buckling, they are brought to grade by replacing sufficient blocks, grout, sand cushions, and concrete foundation so that the repaired sections have the same general design and composition as the original pavement.

The foundations of repairs to block pavements are constructed of Class A concrete which is float-finished unless the original pavement was of the monolithic type, in which case the repair is made of monolithic concrete and the block set into the green concrete. The elevation of the surface of the foundation is governed by the depth of the blocks and the depth of sand cushion desired.

If a sand cushion was placed in the original block pavement, a similar sand cushion is constructed when repairing such pavements. The sand cushion is placed on a concrete foundation at a depth of at least 1 inch where possible and in all cases at a depth so that blocks

(*Continued on next page*)

Hoists to Fit the Job



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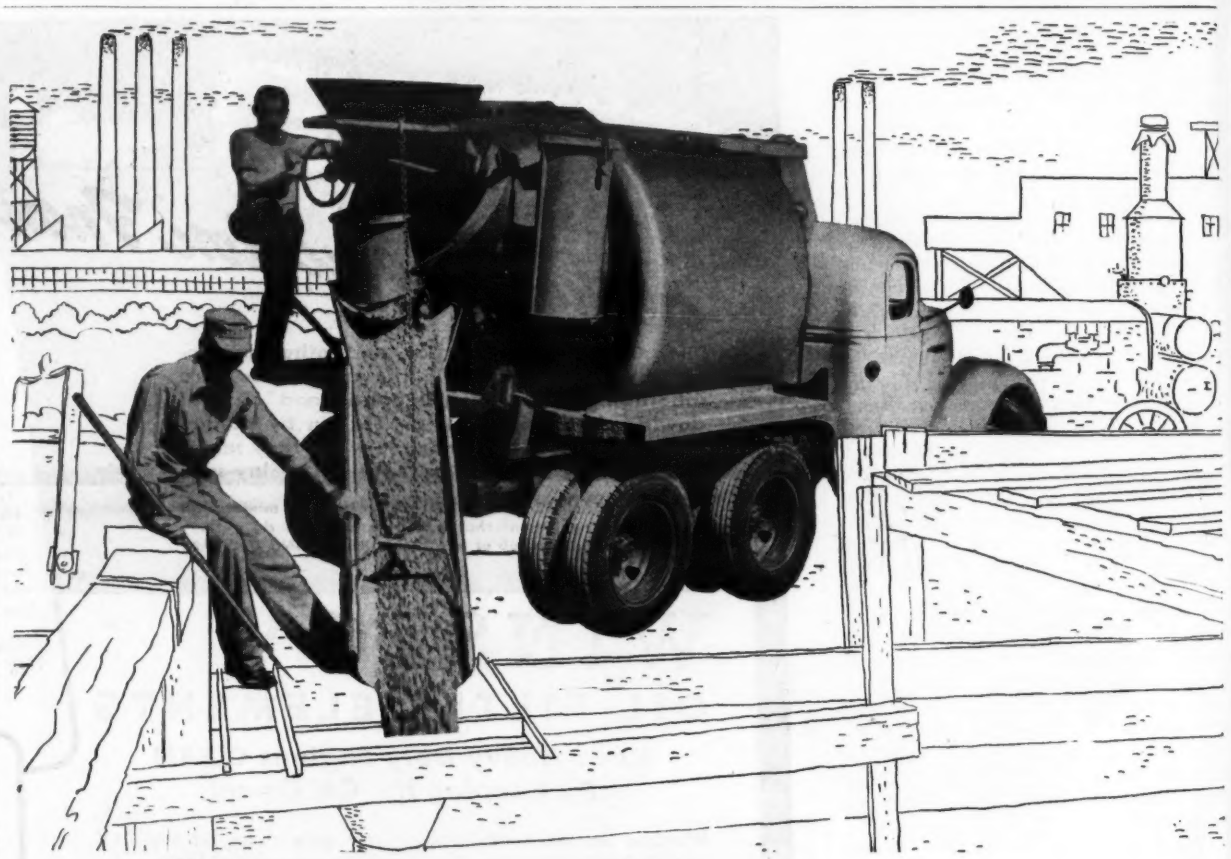

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REX CHAIN BELT COMPANY of Milwaukee

CONSTRUCTION MACHINERY

PUMPS PAVERS PUMPCRETES MOTO-MIXERS MIXERS

Mud-Jacking Corrects Sunken Slabs in Conn.

(*Continued from preceding page*)

when pounded into it will be at the proper elevation. In areas where water is likely to seep into the pavement, or where pavement failure seems to be due to a shifting cushion, portland cement is mixed with the sand for the cushion in the proportion of one part cement to three parts of sand mixed dry and placed dry.

In making repairs to block pavements, the entire area of the repair is cleaned thoroughly of dirt and debris, including any mortar which adheres to blocks at the edges of such areas. A thorough cleaning is also given all blocks which are to be reset. New blocks used are identical to those in the original pavement, or as closely matching in size and kind as can be found. The blocks in repaired sections are laid in the same standard pattern as those in the surrounding pavement. Half-blocks or bats are not used unless it is impossible to replace the surface without them. Old blocks which are being used again are turned so that the better surface is on top. After the blocks are set in position, they are rolled or tamped to force them firmly into the sand cushion and to bring their surfaces to correct grade. Individual blocks which sink too deeply into the cushion, or which cannot be forced sufficiently low, or which do not have an even bearing, are lifted out and cushion material added or removed so that the blocks can be firmly seated at the correct elevation.

The replacement of grout in block pavements is done with the same kind of material that was used on the original pavement. When bituminous material is used, the openings between the blocks are poured full and the bitumen allowed to settle. The openings are then filled again and a thin coat of bitumen, not more than 1/32 inch thick, is brushed over the entire repaired area. When concrete grout is used, the openings between the blocks are completely filled with a thin mixture of one part portland cement, two parts sand, and water. After this application has settled, the surface of the repair is swept with a second application of the same mixture so as to fill completely all the openings between blocks, and to leave a very thin coating of grout over the pavement surface. Repairs filled with bituminous grout are opened to traffic immediately after the work is completed, but repairs filled with cement grout are kept closed to traffic for at least thirty-six hours.

Mud-Jacking

Mud-Jacking in Connecticut is used to fill voids under concrete pavement and to restore sunken concrete-pavement slabs or large portions of slabs to the correct grade. The selection of Mud-Jacking projects is determined by (1) the size of the area involved, (2) the seriousness of the existing hazard, (3) the condition of the pavement itself, and (4) conditions in the sub-base or elsewhere which caused or contributed to the need for correction. In general, Mud-Jack work required on newer, more costly pavements is given precedence over work required on older, less valuable pavements. Mud-Jack operations, because they deal with highly unpredictable conditions, cannot be fully standardized and therefore always are carried out under the supervision of men especially skilled and experienced in this type of work.

On all Mud-Jacking projects, sufficient surveying work is done and the necessary profiles drawn up well in advance of actual operations, (1) to prove that Mud-Jacking is required, (2) to determine the extent of the necessary correction, (3) to furnish information for estimating the cost of correction, and (4) to establish, in the field, control points to be used when jacking the sunken pavement to correct the grade.

Mud Mix

Any type of earth which will hold water under a pressure of 500 pounds per square inch, such as loam, topsoil, hardpan or clay, is used as the aggregate in the mud mix. All such earth must pass a 5/8-inch mesh screen, be free from rubbish, and not contain more than 5 per cent of sand. The mix is made up with two bags, 188 pounds, of portland cement per cubic yard of aggregate to accelerate its dehydration and reduce its shrinkage after it is placed. Additional portland cement is used to compensate for an excessively wet condition in the subgrade of the pavement.

The amount of water in the mud mix is determined by the type of jacking to be done, and by the condition of the pavement subgrade. In general, a stiff mix, made with little water, is used for concentrated and irregular jacking in limited areas, while a thin mix, made with considerable water, is used for uniform jacking or jacking extending over relatively large areas. A thin mix also is used, as a general rule, when the aggregate is especially sandy which makes a

(*Concluded on page 52*)

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Ohio Road Problems Presented By Sours

Buckeye State Report to House Roads Committee at Hearings on HR 2426 Is Concise and Complete

✦ OHIO has a variety of road problems, as it is both an industrial and agricultural state. Industrially, Ohio ranks as the fifth state in the value of manufactured products, and its industrial employment has recently reached third place among the states. Its great industry is iron and steel, ranking second among all states. It ranks first in the nation in steel products, such as forgings, bolts, stamped and pressed-metal products, and is second in foundry, machine-shop and machine-tool products. Its second industry is rubber tires and related products, ranking first in the nation in this field, and producing over one-half of the entire United States output.

It ranks first in the manufacture of clay products, and first in the manufacture of construction machinery. Other great industries in Ohio are motor vehicles and automotive parts, chemical, glass, printing, paper, electrical apparatus, clothing, cement, petroleum products, stone, sand and gravel, flour, dairy products and many others. During the war, vast munitions and armaments plants have sprung up. It is also one of the leading states in the manufacture of military airplanes.

Ohio is truly a great industrial state. The need for modern and adequate highways to feed these vast and wide-spread industrial areas and for the transportation of employees is quite obvious.

Mineral Resources, Agriculture

Ohio ranks tenth in the United States in the value of mineral resources. Coal, clay, cement, coke, lime, natural gas, petroleum, sand and gravel are the principal mineral products.

While Ohio may not be generally known as one of the great agricultural states, it ranks fifth among all states in total agricultural income. It ranks third in the production of soy beans and third in clover seeds, fourth in poultry, fifth in corn, wheat and hogs, and sixth in dairying.

Most of the farm products produced in Ohio are consumed in its industrial and urban areas. Hence it can be readily seen that motor transportation from farm to market calls for improved local and feeder roads on an extensive scale.

Population Distribution

Over 57 per cent of Ohio's population resides in municipalities of 10,000 and greater, according to the 1940 Federal census. The municipalities fall in the following population brackets:

59	municipalities	over	10,000 population
26	municipalities	over	25,000 population
12	municipalities	over	50,000 population
8	municipalities	over	100,000 population
127	municipalities	between	2,500 and 10,000 population

The municipalities in Ohio are reasonably well distributed over the state, although there is some concentration in certain areas. Consequently, for many years, Ohio has had a network of heavily traveled roads connecting the centers of population. Necessity caused many of the connecting roads to be built early, which, in many respects, has created a problem today because those roads were not designed to meet present-day requirements.

Traffic Problems

Ohio is so located geographically that its roads carry a large volume of transstate traffic. Lake Erie on the north screens off traffic which might normally flow westward from the northeastern states so that there is a very heavy concentration crossing northern Ohio. In many respects it might be said that Ohio is located at the transportation crossroads between the nation's great industrial centers.

Normal traffic plus the heavy wartime movement of materials has imposed a severe burden on its arterial highways. While, for some years, much progress has been made in developing highway improvements on the trunk-line system, the deferment of needed improvements during the war period, combined with the destructive effects of heavy hauling during this period, has brought on the need for reconstruction and modernizing on many of the trunk-line routes. This

(*Concluded on page* 56)

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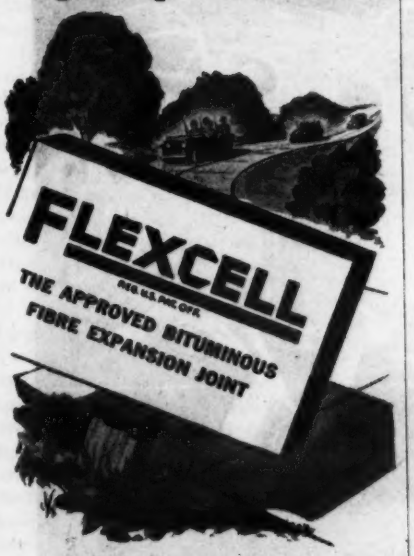

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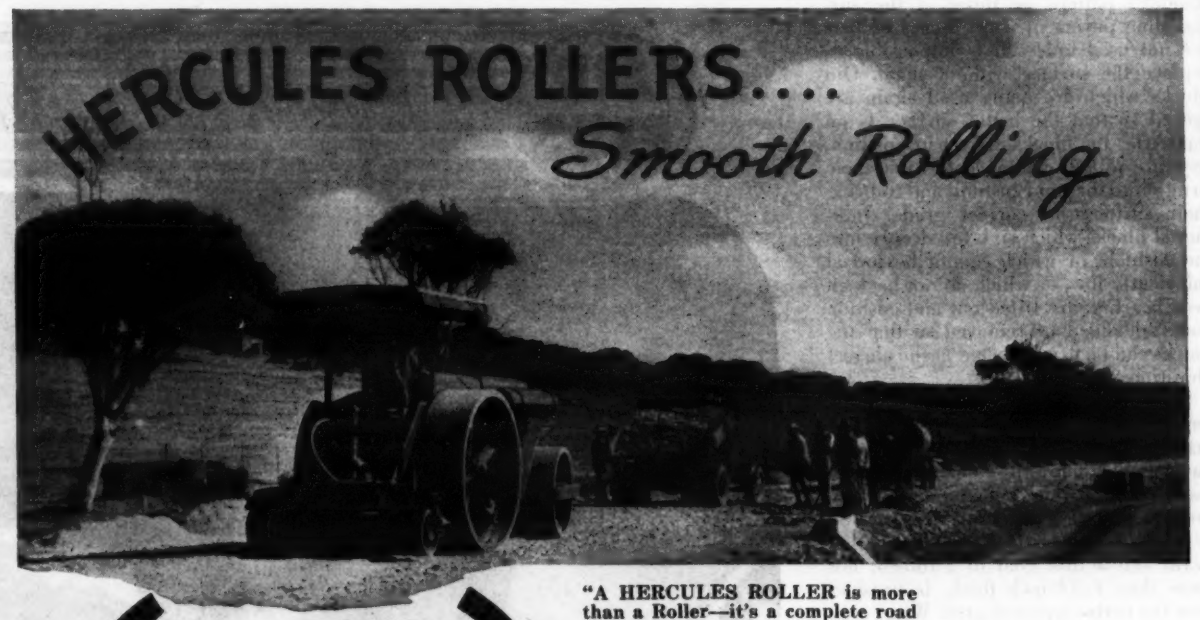

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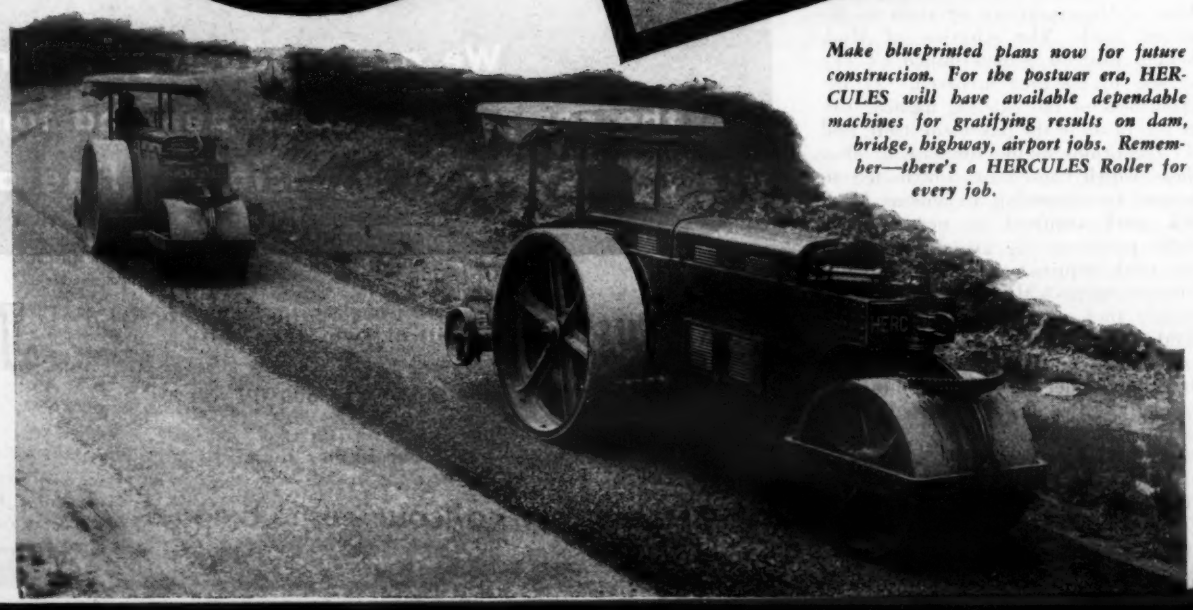

Make blueprinted plans now for future construction. For the postwar era, HERCULES will have available dependable machines for gratifying results on dam, bridge, highway, airport jobs. Remember—there's a HERCULES Roller for every job.

Mobile County Builds Highway and Culvert

(*Continued from page 9*)

Cedar Point Road Relocation

When Brookley Field was extended from the original conception of a base for the shipping of repaired planes to Panama and other overseas bases and became a much larger center for servicing planes for the entire southeastern section of the United States, the increased area of the Field closed Cedar Point Road, a county highway. In order to provide highway service for the county population south of the Field, it was necessary to construct 1.6 miles of new road connecting an existing highway farther to the west with the portion of Cedar Point Road to the south of the Field. A minimum 120-foot right-of-way was purchased along the west and south sides of Brookley Field, and a 36-foot double bituminous surface treatment top on an 8-inch compacted sand-clay base was constructed.

The base course was primed with tar at the rate of 0.3 gallon per square yard and allowed to cure. This was covered with a hot application of 0.4 gallon per square yard of AC-15, an asphalt with a penetration of 150-200, and 50 pounds per square yard of coarse slag aggregate from 1-inch down to ¼-inch rolled by a pneumatic-tire roller. Over this was applied 0.28 gallon of AC-15 per square yard, immediately covered with 25 pounds per square yard of fine slag aggregate cover from ⅜-inch down to ¼-inch, also rolled by a 5-ton pneumatic-tire roller. The roller used on this inverted-type penetration was a county-owned semi-trailer with four wheels in front and eight behind.

In order to expedite the work, the Alabama Highway Department lent the county the necessary distributor, spreader boxes, rotary broom and blower at no cost. Using force-account free labor, with the minimum cost for equipment, the county laid this road for 22 cents per square yard.

Novel Culvert Construction

A double Armco Multi-Plate culvert was designed with a 13-foot span and a 9-foot rise to get 200 square feet of opening to care for drainage near the south end of the new section of road. The culverts were designed with a bottom to prevent scour and also to give greater stability to the structure, which was to carry a 5-foot fill on boggy ground.

Delay in getting the required priorities left the county without the needed high priority to get the culvert on which bids had been taken. This made it necessary to look about for some other material that could be delivered under the priority secured. It happened that a New Orleans company which had been building igloo forms for Ordnance igloos had in stock some multiple channel forms with a rise of 9 feet and a span of 26 feet. A sufficient amount of these was purchased for an 85-foot culvert and erected with a 6-inch concrete floor between the concrete footings and with rubble-masonry concrete headers and wing walls at either end.

The channels are 3½ inches web and 2½-inch flange and welded to lap 2 inches, thus increasing the section modulus and with it the structural rigidity of the arch. The arch was erected in sections and bolted up for construction and then stitch-welded to complete the erection permanently. The corrugated structure thus built was coated with red lead as a base coat and then with a cold application of Bitumastic enamel inside and outside. The culvert is of 10-gage steel throughout.

New County Equipment

The construction of the new section of Cedar Point Road stimulated the purchase of considerable new equipment by the county. The Army paid the county $75,000 for the loss of the highway which was condemned for use by the Field, and the county immediately purchased what it needed in the way of equipment to rush the construction of the roadway. This included a 5-yard Austin-Western wheel scraper, three Caterpillar Thirty tractors with power take-off so that any one could be used with the scraper, and a LeTourneau bulldozer. A ⅜-yard P & H shovel with a shovel boom and stick and a 30-foot boom for dragline and crane operation and a clamshell bucket, as well as a Warco grader, completed the purchases, amounting to about $30,000 for equipment.

It was expected that the highway could be completed for the balance of the $75,000 received from the Army, but $20,000 more than was received was expended in the difficult section, and about $10,000 more was required to dress the shoulders and complete the ditches. Unfortunately, this road became a center of discussion in a political campaign, but the entire construction was eventually completed within the amount of money received for the work, if the cost of the new equipment is not charged to the work. It is seldom that any construction organization can afford to charge off the entire cost of new equipment to the first job on which it is used. The county now has in its new shovel a unit that the county engineer reports is one of the most useful pieces of equipment the county has ever owned because of its versatility.

Donald Lee Smith is County Engineer of Mobile County.

Drawing Instruments

A new folder describing and illustrating Bruning professional drawing instruments has just been issued by the Charles Bruning Co., 4700 W. Montrose Ave., Chicago, Ill. These sets are made of brass, nickel-plated and highly polished, and all instruments have replaceable needle points. They may be purchased in complete sets, or separately.

Copies of this folder may be secured by interested contractors and engineers direct from the manufacturer by mentioning this item.

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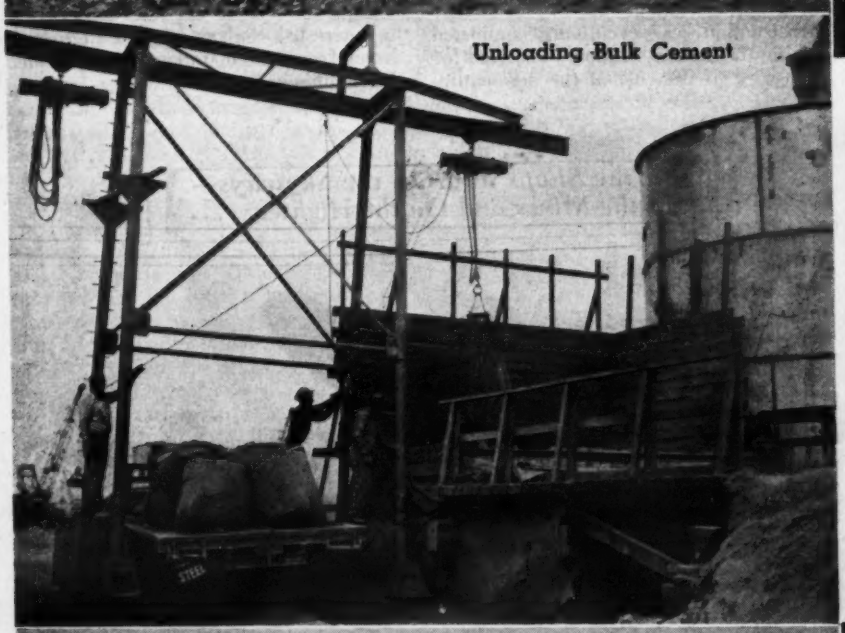
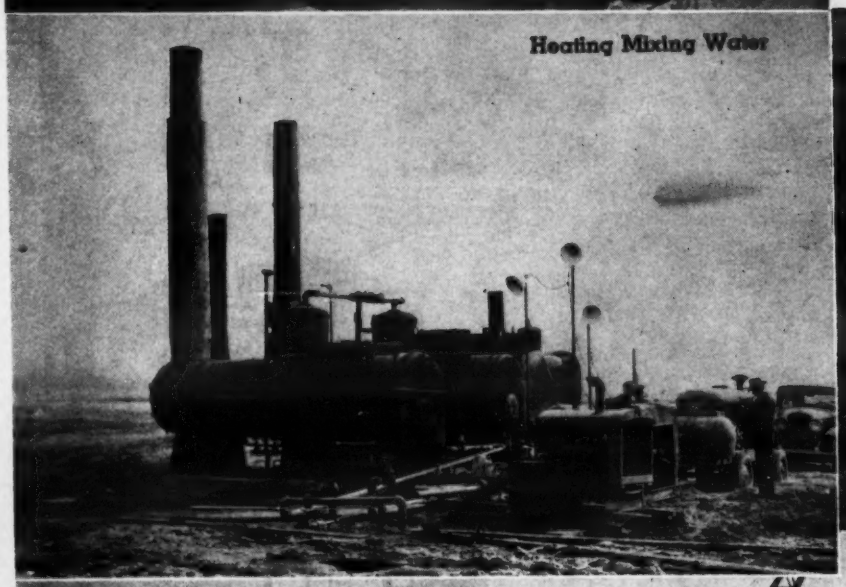
Compacted Subgrade

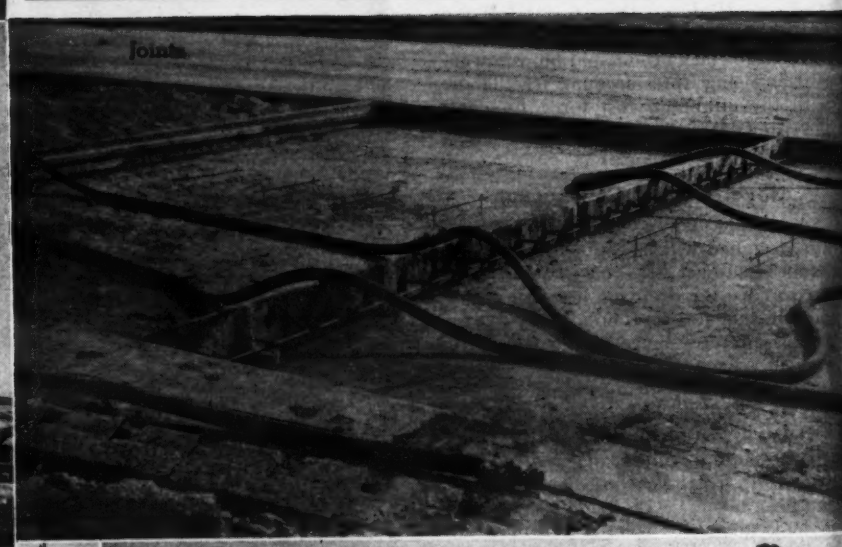


Unloading Bulk Cement

Concrete Constru
At a Desert Airf



Heating Mixing Water



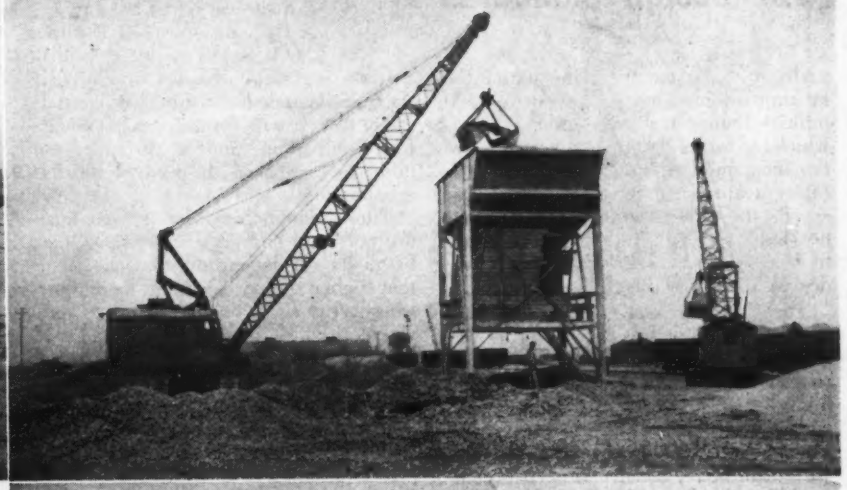
Joints

Finishing and Joint Cutting

Moving a Finisher

Building Fine Grade

Batching Aggregates

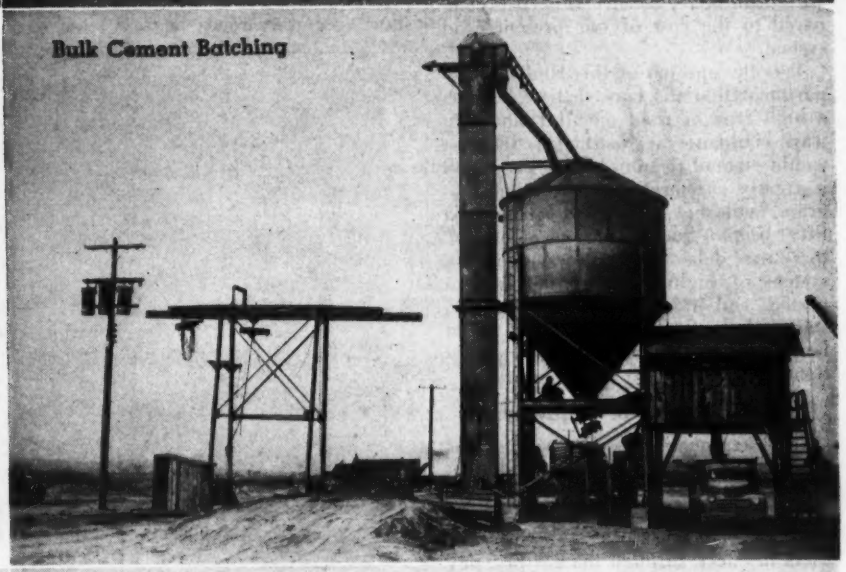


...struction ...Airfield

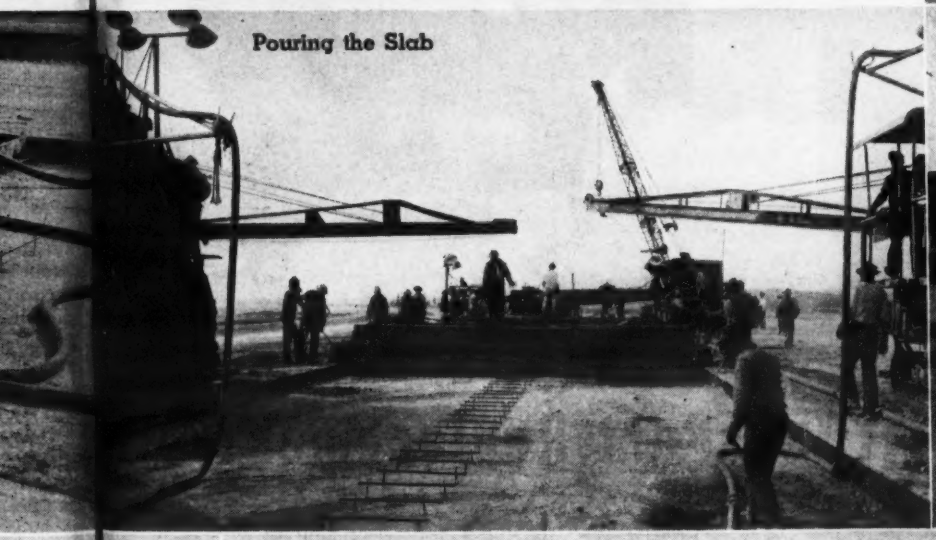
...Equipment and Methods Used By Contractors for Rapid Paving Of 230,000 Square Yards of Standing Area at Muroc Airfield

(U. S. Engineer Photos)

Bulk Cement Batching



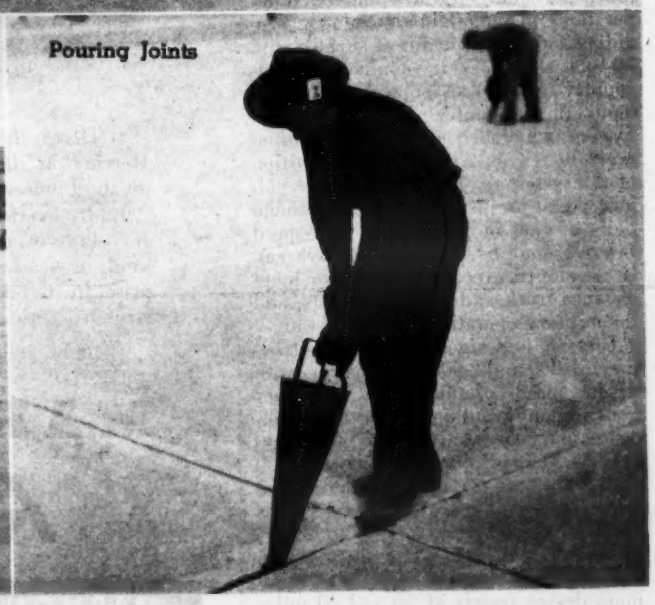
Pouring the Slab



First Two Finishers

Heating Joint Filler

Pouring Joints



Utah Roads Classified For Design Standards

(*Continued from page 27*)

highway departments of the nation, to attempt to construct speedways for 100 mph. Demonstrations on highways which, as far as design is concerned, are the most modern and have all of the safety features, show that at excessive speeds the motor-vehicle operator does not have sufficient judgment or ability to handle his car and travel with any degree of safety.

The Interregional Highway report suggests a design speed of 75 miles per hour in rural conditions. The standards required for this design speed are very high as to alignment, sight distance, widths of surfaces, rights-of-way, and limited-access facilities, which will require very heavy construction costs compared to the cost of our present road system.

It is the opinion of this Highway Department that the construction of such a high type of road on all Utah highways could not be justified as the cost would amount to sums which, even with a greatly accelerated construction program, could not be reached for the next fifty years. Such a program would, therefore, delay the completion of any system of highways over too long a period, and it is, therefore, felt that a standard should be adopted that might be placed in operation, with few exceptions, within the next twenty years.

Classification of Highways

It is reasonable to assume that the amount of traffic a heavily traveled highway carries should be entitled to a higher standard than the more lightly traveled road, inasmuch as the highway users in effect, through the gas tax, pay a toll for using such a road, and are, therefore, entitled to have that toll returned to the highways somewhat in proportion to their use.

Utah has, therefore, classified its highway system into various divisions for purposes of minimum design standards:

Class A roads include four-lane construction, with design speeds of 75 miles per hour in rural sections and 55 miles per hour in mountainous country, to serve traffic carrying more than 3,000 cars per day, except where sight distance is difficult to obtain for a two-lane road, in which case a four-lane road will be adopted on highways carrying over 2,000 cars per day.

Class B will include roads carrying between 2,000 and 3,000 cars per day. The design speeds on these roads are 75 miles per hour on rural and 55 miles per hour in mountainous country, providing for 24-foot width of surface with 10-foot shoulders in non-mountainous country and 6-foot shoulders through mountainous country. The Interregional System is included in this classification, even though on a considerable portion of the system the traffic is of lower volume. This is justified from a national point of view in order that a high-speed Interregional System of highways can be developed over the country for long-distance truck and bus movements, and for military operation in time of war.

Class C is designed for traffic of between 1,000 and 2,000 cars per day, with design speeds of 60 and 50 miles per hour in non-mountainous and mountainous country, respectively.

Class D roads, carrying between 300 and 1,000 cars per day, will have minimum design speeds of 50 and 45 miles per hour respectively.

Class E roads, carrying between 75 and 300 cars per day, will have minimum design speeds of 50 and 40 miles per hour respectively.

Class F roads, carrying less than 75 cars per day, will have minimum design speeds of 40 and 30 miles per hour respectively.

One of the most costly provisions necessary on two-lane roads, to meet higher design speeds, is the passing and non-passing sight distance. At 75 miles per hour 2,600 feet is required, with a non-passing sight distance of 800 feet. At 60 miles per hour this is reduced to 2,200 feet passing sight distance and 525 feet non-passing and at 50 miles per hour, to 1,500 feet passing and 400 feet non-passing.

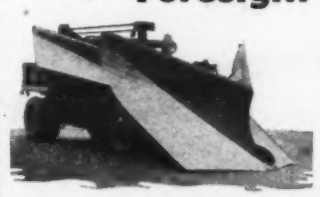
These adopted minimum standards are not rigid and some exceptions must be made. It is our opinion, however, that higher standards should be adopted wherever possible on any section of road where the cost is reasonable, and that lower standards should not be adopted except when very heavy costs are involved.

It will be noted that there is no distinction between secondary and primary roads in the above classification. On short secondary roads feeding from an urban area into a main highway, where there is no justification for high speeds, a lower standard should be adopted than provided for a main highway. Secondary roads should be considered individually by the highway engineer, who must give proper thought and use judgment in selecting an adequate economical design.

Other features in the design standards for new work in Utah are flat cut slopes, flatter fill slopes, and, with the exception of the Class F road, no surface width less than 24 feet. The bases will be designed to handle adequately the heaviest legal truck loads. Grades will be reduced, with the maximum, except for the last two classifications, 6 per cent in mountainous country and 5 per cent in rolling country. Bridges will be widened to eliminate any necessity for the use of

(*Continued on next page*)

Foresight Pays DIVIDENDS



—MANY DAVENPORT-FRINK SNO-PLOWS

—performed their snow clearing functions without a hitch last winter BECAUSE their owners anticipated their repair needs EARLY and were READY when the snows came. We suggest equal foresight for next winter. It will be a pleasure to supply the Sno-Plow repair parts you will need for top efficiency.

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That is the report of the driver of this Marmon-Herrington *All-Wheel-Drive* converted Ford truck on the Pioneer trail of the Alcan Highway.

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It was this driver's first experience with a Marmon-Herrington *All-Wheel-Drive*. No wonder he was surprised, for the ability of a Marmon-Herrington to conquer the worst possible going, is a revelation. It goes places and does things entirely beyond the ability of any "ordinary" truck, as has been proved by hundreds of drivers in the most difficult civilian and military services.

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MARMON-HERRINGTON *All-Wheel-Drive* TRUCKS

MARMON-HERRINGTON CO., Inc., INDIANAPOLIS 7, INDIANA

Cable Address: MARTON

Future Highway Work Being Planned in Utah

(*Continued from preceding page*)

"narrow bridge" signs. They will be a permanent type of structure designed for the maximum legal load, except possibly the last classification, where the type of traffic using the road will determine the amount of money that can justifiably be expended on this low-volume traffic road. Sharp curves will be a thing of the past. Rights-of-way will be wide to permit a full ultimate expansion of the road.

Limited Access

Utah is just beginning to study the use of limited access on its highways. If the Interregional Highway Committee recommendations are adopted, all roads on this system will have limited access. The problem is relatively simple in Utah, except along U. S. 91 from Brigham City to Santaquin. Through this area there are many natural obstacles within a narrow valley. Also, this area is traversed by several railroads, is relatively densely populated over a considerable portion, especially along the existing highway, and therefore will require an intensive study to determine a feasible route which might salvage as much as possible of the existing system, adequately serve all of the communities along the route, and not cost in excess of a sum that might reasonably be used for such construction. The limited-access road location into and through the large cities will require joint intensive studies by the Federal, state and local authorities.

Due to the wider rights-of-way prevailing in Utah city streets, and the limited funds available for highway construction, this problem has not previously been considered. In addition to the benefit to the users in the elimination of side interference, with resulting safety, the benefits of such a development to the city are many, as it tends to retard the decentralized development of the business district, which causes tremendous losses in real-estate value. It will further eliminate the long string development along our highways, which is a serious menace to the functioning of the highway and to established city business.

There is a large adjustment to be made in creating a limited-access road design, as it will materially affect many businesses. The highway should certainly not be made subordinate to the welfare of business along the route. We have paid high costs for rights-of-way in the past, including severance damages, only to find that the owner of the property capitalized on the highway, selling frontage at many times the previous acreage value. All this is at the expense of the normal operation of the highway. In fact, it can, and has in many cases, completely destroyed the entire highway investment. Limited-access design would tend to eliminate this condition and aid in confining businesses to the community centers.

Limited-access design through the urban and metropolitan areas is expensive and can be considered only if liberal highway appropriations are made available. Costs through urban and metropolitan areas are estimated at $500,000 to $3,000,000 per mile. No estimate has been, or can be, made of the cost of adopting limited-access facilities on the entire Interregional System in Utah until a thorough study is made as to the best location, an appraisal made of right-of-way costs and an estimate made of construction costs. A very rough guess would be a $50,000,000 increase in cost. This is the ideal road and the only road which can be used at higher speeds with safety. The question is entirely one of financing.

Post-War Program

During the past two years, Utah has had a larger highway construction program than during the two previous years, due to the numerous access roads that had to be constructed to war industries. The Highway Department's engineering force was depleted very materially by its personnel entering the armed services or going to more remunerative work. This left the Department working to its utmost to get the needed roads under construction, without permitting any thought to be given to post-war work. During the last few months, however, most of this construction has been completed and the Department is now working mainly on post-war contract plans.

Utah has submitted to the Public Roads Administration an advance engineering program which provided $137,000 for engineering work, under a special Federal appropriation, on 119.68

(*Concluded on page 79*)

GEERPRES
Mop
Wringer

reduces mop costs from 25 to 50% over other methods of wringing—retains the mop fabric in a soft fluffy condition most desirable for rapid mopping. No more loose mop strings to catch around legs of desks and furniture when using GEERPRES.

New construction makes this wringer last for many years. Two popular sizes cover the entire commercial field. No. 1624 model will wring mops 14 to 24 oz. incl. No. 2436 model will accommodate mops 20 to 36 oz. incl. SEND FOR FREE CIRCULARS.

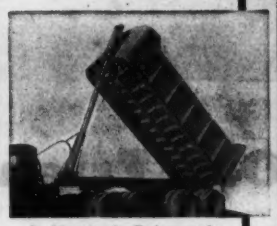
GEERPRES WRINGER, INC.
Manufacturers of High Grade Mopping Equipment
MUSKEGON, MICHIGAN

1. Direct-Lift Hoist. Body has Trussed Understructure. Exclusive feature.

2. Cam and Roller Hoist for long wheelbase chassis. High ground clearance for piling.

3. Typical Installation for Six Wheelers.

4. Telescopic Hoist. Heavy-Duty Body.



5. Dual Telescopic Hoist and Rock Body. Down Folding Gate.

6. Vertical Telescopic Hoist for long Bodies.

7. Tanks for all types of liquids.

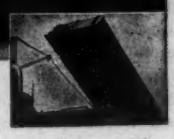
8. Street Flushers and Sprinklers.

GAR WOOD
TRUCK EQUIPMENT
HOISTS • BODIES • TANKS
WINCHES and CRANES
For TRUCKS and TRAILERS

GW engineers specialize in designing the type of equipment best suited for the work to be performed. Gar Wood Industries, Inc., manufactures hydraulic and mechanical hoists, dump bodies, winches, cranes and tanks (including flushers and sprinklers) for a wide variety of uses on trucks and trailers.

9. Hydraulic Repair Tower.

10. Cranes — all types and sizes for handling pipe, machinery, etc.



11. Crane with Winch and Dump Body.

Refer to Picture Number when ordering literature

12. Tree-Moving Crane.

13. Picks up, transports and resets treeballs.

14. Load-Packer— compresses garbage and rubbish. Greater loads—fewer trucks and men required.

GAR WOOD INDUSTRIES, Inc.
DETROIT 11, MICHIGAN

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

BULLDOZERS • CABLE & HYDRAULIC SCRAPERS AND CONTROL UNITS • RIPPERS • TAMPERS

Safety Good Business On Big Jobs or Small

(*Continued from page* 17)

On one such job, the time spent in the proper routing of these trucks more than paid for itself, as it certainly resulted in a speedier handling of the concrete and a smooth flow of traffic which, in turn, paid in the reduction of vehicle accidents on this job. We tried to standardize our methods to such an extent that trucks were pulling straight out and backing of trucks was held to a minimum. We tried to eliminate points where trucks had to cross the path of another line of traffic. A good method to develop planned safety economy is to eliminate interruption where uncontrolled interference is likely to occur between men and equipment or between men and men.

Safety Costs

Safety costs should be kept at an absolute minimum at all times by perpetual and rigorous follow-up. This is good business, because it it far more to your credit to achieve superlative results at minimum costs. Anyone can do any job where costs are not a factor. Those managements who provide adequate and reasonable allowance for the expenditure of funds and make or cause to be made the necessary and detailed interpretation of needs are, as you might expect, profiting economically in public good will, in good employee relations, and are experiencing no ill effects of conscience. This is proof that adequate safety can be, and has been, translated in tangible results which can be measured.

Whatever other examples might be taken, of either lesser or greater severity, one will find, as so many have found, that indirect costs almost always exceed the direct costs of an injury by four to one. Safety engineering is an economical factor in direct proportion to a man who can use his personal zeal for efficiency, the experience and knowledge of the work that has to be done, plus the most detailed possible understanding of the personalities of individuals, especially foremen and superintendents.

That safety engineering is a productive function, when accomplished factually with quality, is as undeniable as stating that only buildings with adequate foundations stand up or that men with two arms can do more work than men with one arm.

Smaller jobs, just as much as large ones, need a safety planner who can qualify with a knowledge of insurance, economically applied, and enough knowledge of insurance laws to make adjustments as locations are changed. That he should know safety in all its phases is paramount. He should be well versed in traffic, lighting, fire hazards, policing, and, above all, he should be a designer who can fill in the details that help contracting make the contribution to society that justifies our existence.

It is also our belief that safety promotion requires consideration by contract-letting agencies which add to general safety progress when they give consideration to the low bidder's safety record as well as his ability to construct.

From a paper presented at the 32nd Annual Safety Congress of the National Safety Council.

New Basic Resin Has Varied Applications

The current availability for limited use of a new basic resin having widespread applications has been announced by the U. S. Stoneware Co., Akron, Ohio. The new resin, named Duralon, a furane derivative, is characterized by low water absorption, insolubility, after activation, in any solvent or combination of solvents, high electrical resistivity, absolute stability in storage and handling, and ease of workability.

Although its possibilities are still not entirely known, experimentation has already shown Duralon's applications to impregnate stone, concrete, plywood and other porous materials; as a protective coating and insulating material; as a surface bonding agent for wood, plywood, and similar materials; as a modifying agent for paints and varnishes to increase water resistance, toughen films, and improve adhesive and drying qualities; and as a wetting, plasticizing or tackifying agent for synthetic-rubber compounds.

The resinification properties of the furanes have been known for almost a hundred years, but the difficulty of controlling their reaction in manufacture and their stability in storage made impossible any substantial usage of their desirable properties. U. S. Stoneware chemists have been at work on the problem for some time, and have now achieved a complete stabilization of the resin so that it can be made available generally for commercial use.

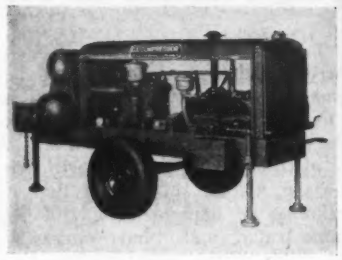
Further information on Duralon and its applications may be secured direct from the producer.

New Appointments By Pneumatic Tool Co.

The Independent Pneumatic Tool Co., Chicago, Ill., has announced the appointment of Edward N. Haas as Works Manager of its Aurora, Ill., plant, to succeed W. H. Brewer who has been named General Factory Manager. John P. Bank succeeds Mr. Haas as Assistant Works Manager.

Mr. Brewer has been connected with the company since 1907, and after serving in various capacities was made Works Manager in December, 1940, succeeding the late Frank B. Hamerly, a former Vice President of the company. Mr. Haas has been Assistant Works Manager since January, 1943, and associated with the company since 1911. Mr. Bank started with the company in 1929 and has been Foreman of the Training Department for the past two years.

OK PORTABLE AIR COMPRESSORS



Single-stage or two-stage; equipped with gasoline or diesel engines or electric motors, and with steel or rubber-tired wheels (solid or pneumatic). Sizes: 105 to 210 cubic feet at 100 pounds pressure.

Write for Latest Complete Catalog

O. K CLUTCH & MACHINERY CO
Columbia, Pennsylvania, U. S. A.

Old Friend of the Outfit

Pulling a jeep out of a submerged shell hole while under enemy fire takes plenty of you-know-what. True, it's only one of hundreds of jobs an invasion force may be called upon to do. And, it's just one of scores of ways in which good, dependable wire rope comes in mighty handy.

On the far-flung battlefronts—and at home, too—men of action know that even under the most adverse conditions they can count on the performance of Wickwire Rope.

Right now we are making more rope than ever before—but it has more jobs to do in more places. It's smart to take good care of the rope you now have so it will last longer and so our fighting forces can have more for *their* work.

Proper selection, application and usage of wire rope will make it pay dividends in longer life and higher production. Write for a copy of our free book "Know Your Ropes." And, if you have a wire rope question, we'll be happy to be of service. Write Wickwire Spencer Steel Company, 500 Fifth Ave., New York 18, N.Y.

HOW TO CONSERVE WIRE ROPE

Thousands of wire rope users—old hands and new—have found "Know Your Ropes" of inestimable value in lengthening life of wire rope. Contains 78 "right and wrong" illustrations, 40 wire rope life savers, 20 diagrams, tables, graphs and charts.

SEND FOR YOUR FREE COPY

Send your wire rope questions to:

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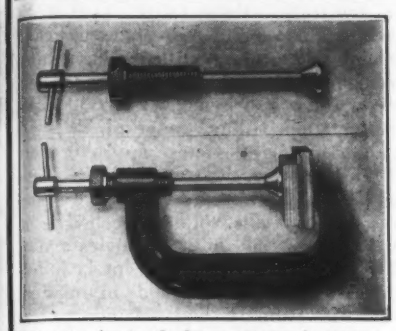

A new type of clamp serves in many ways in shops or on the job.

New Holding Device In Variety of Sizes

A new type of C clamp and pressure unit, known as the Twistite pressure unit, is made by the Mechanics Engineering Co., Box 243, Jackson, Mich. These pressure units, adapted to a specially designed C clamp, provide a fast-operating tool for all types of jobs where clamping devices are necessary.

In the Twistite clamps, the threaded bar has been eliminated and in its place is the pressure unit which is instantly adjustable, locking or releasing the work with a quick turn of the handle. The pressure unit consists of a smooth unthreaded pressure bar and a threaded collar enclosing a roller locking pin in an eccentric spline. The bar is centerless ground, and when released slides freely to any position. It is manipulated by a knob or handle. The foot of the bar, which contacts the work, may be any of several shapes or designs. In operation, the threaded pressure collar is fastened to a jig or fixture. In its unlocked position the bar is free to slide axially into position against the part to be held. A twist to the right locks the bar integrally with the collar. Thereafter, continued tightening develops the required pressure as the threaded collar takes up the load. To unlock, the operation is reversed.

Copies of a bulletin giving further details on the sizes and styles of Twistite pressure units, which are useful in making repairs by welding and many other operations in equipment repair shops, may be secured by those interested direct from the manufacturer.

New Curing Compound

A new membrane curing compound for concrete slabs, walls or structures is announced by the Richkraft Co., Builders Bldg., Chicago 1, Ill. Known as Richkure, this new compound is a clear liquid which, when applied to newly poured concrete surfaces, dries to form a hard dense membrane, sealing the surface and assuring the retention of sufficient water within the concrete for complete hydration.

The manufacturer states that Richkure is quickly and easily applied with either hand or power spray or by brush, one gallon covering 200 square feet. One coat is sufficient to seal the concrete effectively, and it dries in 20 minutes or less. It is supplied in two types, either with or without fugitive dye. The No. 40 type, with 40 per cent solids, meets U. S. Army specifications, and the No. 30, with 30 per cent solids, meets U. S. Navy, CAA, and most state highway department specifications.

A 4-page folder discussing concrete curing by means of the liquid membrane process and the features of Richkure may be secured by interested contractors and engineers direct from the manufacturer. Just mention this item.

Joslin of du Pont Dies

Theodore G. Joslin, Director of Public Relations, E. I. du Pont de Nemours & Co., Wilmington, Del., died suddenly on April 12, in his office in Wilmington. Mr. Joslin, a native of Leominster, Mass., had a varied career in journalism, beginning with the Associated Press in Boston in 1908. From 1931 to 1933 he served as Secretary to President Hoover, and was the author of the book "Hoover Off the Record". His association with du Pont dates from 1939.

New Wet Belt Grinder

Since the introduction of high-speed wet belt machining, there has been a demand for a machine with greater coolant capacity and more rigid construction for greater grinding accuracy. These requirements are said to be met by the new Model AG-8 wet belt surfacer just put on the market by the Porter-Cable Machine Co., Syracuse, N. Y.

Equipped with a 35-gallon self-contained recirculating pump system, this machine has an abundance of coolant readily available for all grinding operations. The manufacturer states that close tolerances, often to 0.0005, can be held on this new machine even by inexperienced operators. Other features include a readily accessible waste clean-out drawer; a new "joggle"-type switch for easier tracking of belts; a higher table for the operator's convenience; a flexible tube to provide "spot" coolant whenever it is needed in greater quantity; and greater platen grinding area.

Further information on this wet belt surfacer may be secured by superintendents of state and county highway department shops and contractors operating their own equipment repair shops by writing direct to the manufacturer.

Write For Details

A TOUGH ROLLER FOR TOUGH JOBS

Pierce-Bear 2-5 Tons Variable Weights

Engineered for economical operation where the going is tough. Compact, easy to operate. Narrow rear roller gives heavy-duty compression. Built-in water tanks for wet rolling. Powered with Allis-Chalmers Industrial Heavy-duty Model "B" gasoline engine.

Manufactured by

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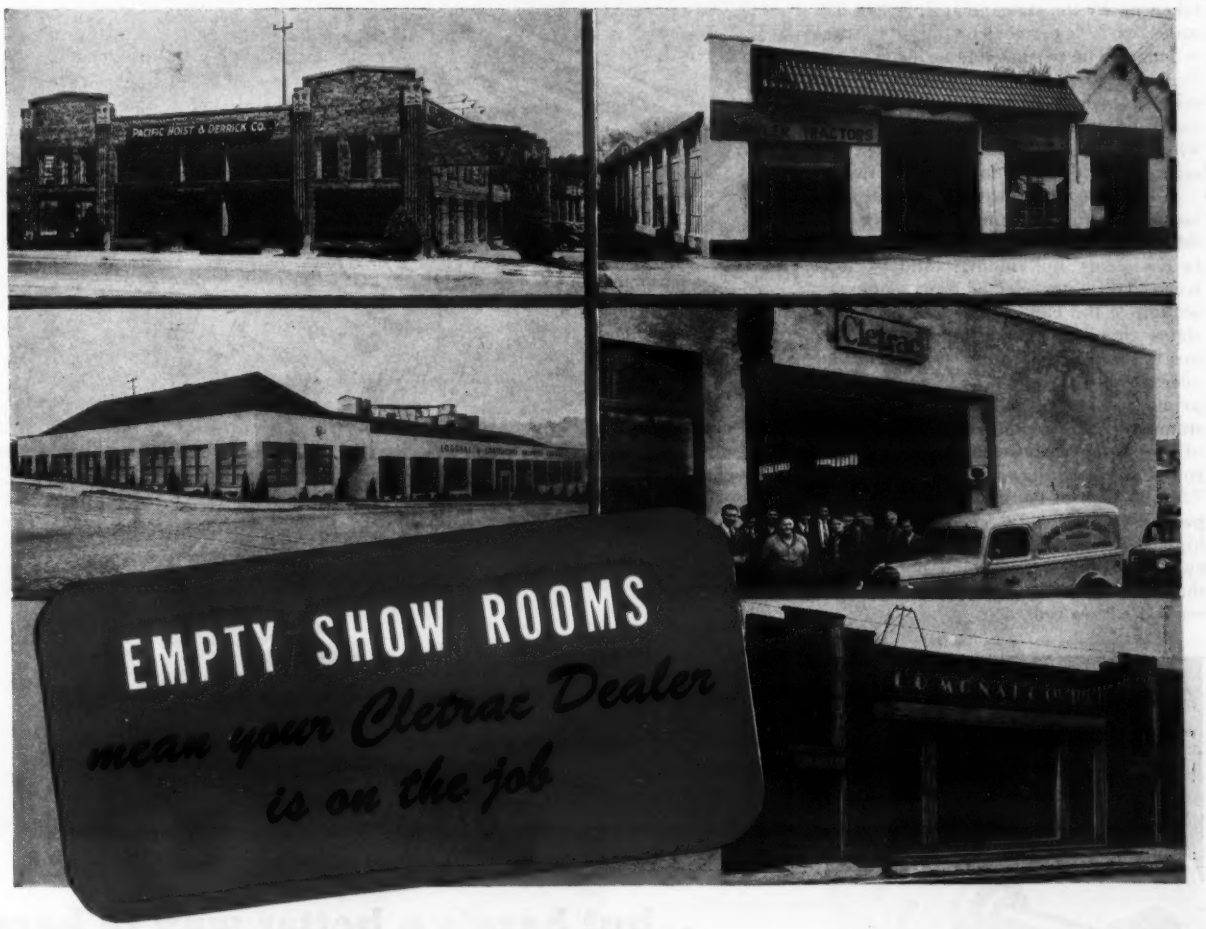


THE show room of your Cletrac distributor is probably empty of new machines. This merely means he is right on the job today in his service department — busier and doing more work than he once thought possible.

Plagued with shortages of men and material, loaded with more demands for service than ever before, he is still doing the impossible, day after day, in helping to keep present tractor equipment in working condition.

In these efforts he is not only making a full contribution to the war by saving time and money for Cletrac owners, but also helping to conserve equipment needed to carry on the jobs of the home front. The big task today is to keep your present equipment running.

There is a limited number of new Cletracs available. These tractors are not in your dealer's showroom but subject to government release. Your Cletrac dealer will gladly assist you in making application for a new Cletrac if you can qualify as an essential user.

CLETRAC REPORTS ON ITS WAR EFFORT

This folder, recently published, tells briefly of Cletrac's part in the war effort. A copy will be mailed on request.

THE CLEVELAND TRACTOR COMPANY • CLEVELAND 17, OHIO

CLETRAC *True-Traction* TRACTORS

Federal-Aid Roads In Secondary System

Expansion of Low-Traffic System Progressing Slowly Under State and Federal Scrutiny; Subsidized Roads

By H. E. HILTS, Deputy Commissioner, Public Roads Administration

✦ THREE major classifications of road and bridge projects will be represented in a post-war program. Those on the Federal-Aid secondary system, the Federal-Aid system, and on that part of the Federal-Aid system which may be indicated as the Interregional Highway System.

Of the 3,267,717 miles of the nation's rural roads and urban streets, 2,964,677 miles are rural roads. The total permissible mileage of the Federal-Aid primary system, although not taken up by the states in full, is 234,838 miles, or 7.95 per cent of the total rural mileage. The permissible mileage of the Federal-Aid secondary system is 296,379 miles, which is 10 per cent of the total rural mileage. The combined systems when fully designated total 531,217 miles or 17.95 of the total rural mileage.

A study covering twenty-five states has been made to determine the service rendered to the traveling public by these two systems individually and collectively. The states selected represent every section of the United States and include states that are predominantly agricultural. Based on pre-war travel, the average daily traffic on the Federal-Aid primary system in these twenty-five states was approximately 57.1 per cent of the total daily traffic on all rural roads in these states. In other words 7.59 per cent of the mileage carries 57.1 per cent of the total rural traffic. The highest concentration of traffic on this system in any state is 68.3 per cent of that state's total rural travel and the lowest is 46.2 per cent.

The Federal-Aid secondary system is relatively new and has not yet been designated by all the states. Most of those which have selected a system confined their initial system to only a part of the permissible mileage, ranging in size from 5 per cent to a complete system. To determine the traffic load that this system carries, the existing approved systems were expanded to cover all allowable mileage by adding roads in their order of traffic importance. The result of such expansion shows that the average daily traffic on this system is approximately 26.9 per cent of the total on all rural roads in those states. This means that 10 per cent of the rural roads in the states covered by the study carry approximately 26.9 per cent of the total traffic.

Combined Federal-Aid Systems

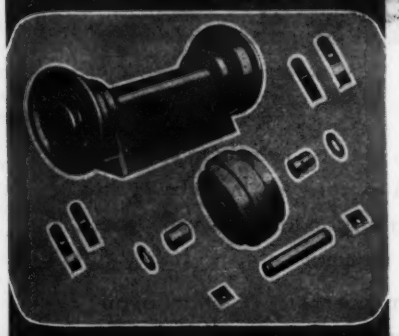
The combined Federal-Aid primary and Federal-Aid secondary systems for the twenty-five states average 17.59 per cent of the total rural mileage. They carry approximately 84.0 per cent of the total travel on all rural roads. These figures are significant as they show the importance and degree of efficiency these two systems attain. The highest concentration of traffic on these two systems in any state is approximately 91.2 per cent of the total rural traffic in that state, and the lowest is approximately 77.0 per cent. The remaining 82.41 per cent of the mileage not on these two systems carries only 16.0 per cent of the total travel.

The question as to how complete is the coverage of the combined Federal-Aid primary and the Federal-Aid secondary systems is illustrated in the following figures: Of the twenty-five states covered by the study, in three states the selection of a complete Federal-Aid and secondary system requires the inclusion of approximately 6,935 miles of road in the traffic-volume range of 10 to 24 vehicles a day; in four states approximately 5,996 miles in the traffic-volume range of 25 to 49 vehicles a day; in eight states approximately 25,639 miles in the traffic-volume range of 50 to 99 cars; in eight states approximately 10,874 miles in the traffic-volume range of 100 to 199; and in only two states the lowest traffic volume reached is in the range of 200 to 299 vehicles a day. Thus it is evident that except in a few states we are able to include in our Federal-Aid primary and secondary systems all roads down to the level of tertiary or land-service roads.

Roads carrying less than 25 vehicles a day usually are close to the tertiary land-service classification. In the twenty-five states analyzed the selection of a complete Federal-Aid secondary system of roads includes 12,931 miles of such low-volume roads or approximately 7.7 per cent of the total mileage of the secondary system in those states. The analysis of this portion of the system, as

(Concluded on page 81)

Dependable Parts Service Keep "CLEVELANDS" ON THE JOB

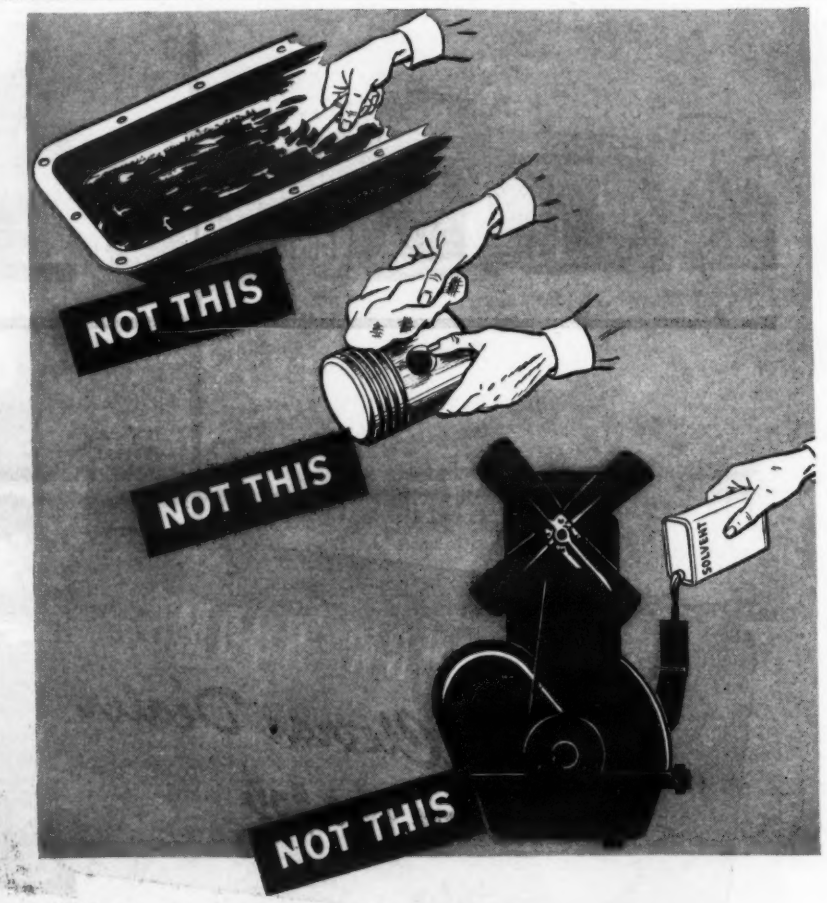


BREAKING production records for new machines to meet military demands is only part of the job. Servicing hundreds of machines (some fifteen to twenty years old) is another tough, important job.

"CLEVELAND'S" recognition of this problem by maintaining superior parts service has won many spontaneous expressions of owner-approval.

"CLEVELAND" will maintain this vitally necessary quality service, and recommends that you as an owner do your part by paying regular attention to lubrication—keeping all bolts tight—using sharp rooters.

THE CLEVELAND TRENCHER COMPANY
"Pioneers of the Small Trencher"



..but here's a better way to keep engines clean . . . to reduce wear

THERE ARE many ways of keeping engines clean. You've probably tried most of them. From digging sludge and "gunk" out of the crankcase—cleaning or scrapping varnish coated pistons, valves and bearings—to adding solvents in the crankcase oil to loosen accumulation. *Now* there is an easier way. Use Stanolube H.D. It eliminates at the source the most troublesome cause of engine deposits—it is inhibited against oxidation. What this means is described at the right. You can find out what it means in longer engine life in your fleet by asking a Standard Automotive Engineer to help you make a test. Call the nearest Standard Oil Company (Indiana) office, or write 910 S. Michigan Avenue, Chicago 80, Illinois, for the Engineer nearest you. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.

Causes of engine deposits. Engine deposits are caused by two principal sources of contamination; 1. Road dust, fuel soot, and other foreign matter which blows by rings. 2. Oil oxidation.

Deposits caused by foreign matter (road dust, etc.) are comparatively easy to control by:

1. Preventing the entrance of dirt through proper maintenance of air filters and piston rings, and good fuel combustion.

2. The use of detergent-type oils which keep these potential deposit-formers in suspension until removed by draining and filtering.

Deposits caused by oil oxidation are more difficult to eliminate. Oil oxidation occurs in all engines, but it is particularly severe under heavy-duty service. It is caused by heat and agitation of oils in the presence of air. Oxidized oil forms varnish or lacquer-like deposits. These act as a binder and speed up the accumulation of dust and carbon deposits.

Detergency plus oxidation stability in Stanolube H.D. Stanolube H.D. is a detergent-type oil, but in addition, it is *inhibited against oxidation.* It prevents the formation of oxidation products because; first, it is made of a petroleum stock of good quality for lubricating oil manufacture. Then by solvent refining the unstable hydrocarbons—those easily oxidized—are removed. Finally, the remainder is stabilized by the addition of a special oxidation inhibitor and detergent developed in Standard Oil laboratories.

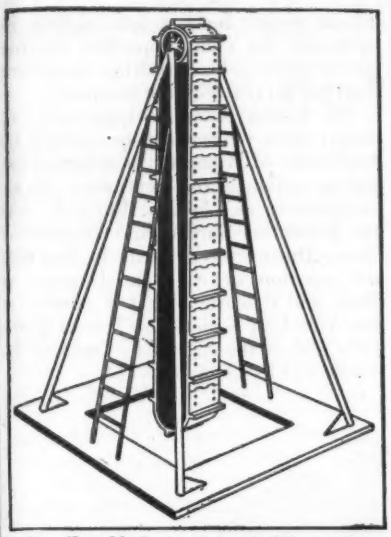
In Stanolube H.D., the rate of oil oxidation is slowed down to the minimum. Its detergency action becomes doubly effective in preventing the formation of deposits from foreign contaminants and the few oil oxidation products which develop. Besides preventing deposits, the mild solvency or purging action of Stanolube H.D. safely removes deposits formed prior to its use and has cleaned up many dirty engines over a period of time.

heat-proofed Stanolube H.D.

Gasoline Powers the Attack . . . Don't Waste a Drop!

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

★ FLEET CONSERVATION SERVICE



An all-welded stand for holding worn tractor grousers during their repair.

Stand Saves Time In Tractor Repair

An ingenious welding stand which, it is reported, has paid for itself many times over in the repair of worn tractor grousers by welding was developed by a mining company which has fifteen crawler tractors to keep in operation. The stand was constructed from scrap material picked up around the shop and its total cost, including electrodes and power, was only $22.25. It was completed in two and a half days' time.

It takes only a few minutes to put up the track and take it down with the aid of a crane, there being only four bolts to take off. With this all-welded stand, it is very easy to turn the sprockets and get the grousers in the most convenient position for welding on applicator bars. The applicator bars used by this company are of manganese, averaging 12 feet in length. It requires three bars for the complete repair of a worn track. The bars are first cut to length, next tack-welded into position, and then the first bead is welded with 5/32-inch stainless steel rod. On the second bead, 3/16 or ¼-inch stainless is used.

This ingenious use of welding was submitted by Conrad D. Krantz of Virginia, Minn., in the Arc Welding News Contest conducted by Hobart Bros., Troy, Ohio, manufacturer of arc welding equipment.

Limited Production Of Civilian Trucks

Announcement has been made by the International Harvester Co., 180 No. Michigan Ave., Chicago, Ill., of a start in the production of medium and light-heavy trucks for civilian use for 1944, as authorized under governmental order. Manufacture of the heavy-duty Model KR-11 began the first of the year. These new civilian trucks will be sold through regular International Harvester branch and dealer organizations to operators whose business requirements place them in the ODT priority list.

The three models available in the 1944 International line include the heavy-duty KR-11 with double reduction drive and a gross vehicle weight rating of 27,000 pounds; the medium-heavy K-7, rated at 16,500 pounds gross vehicle weight; and the medium-duty K-5, with a gross vehicle weight rating of 13,500 pounds. All of these models are available with two-speed rear axles, if desired, and in a variety of wheelbases.

The manufacturer states that several improvements, including more powerful Blue Diamond and Red Diamond engines in Models K-7 and KR-11 respectively, are embodied in these new trucks. The K-7 is equipped with hydraulic brakes with the newly developed Hydrovac vacuum-power system, while the larger model has air brakes. Some of the changes in these basic pre-war models had been contemplated before truck production was stopped by the government in March, 1942. Most of them have been incorporated in various military models since that time and now, under material regulations, it is permissible to make use of them in new civilian production.

Cliff Miller Co. Named Caterpillar Distributor

The Caterpillar Tractor Co., Peoria, Ill., has announced the appointment of the Cliff Miller Machinery Co. as distributor for Omaha, Neb., and surrounding territory, with headquarters at Omaha and a store in Sioux City, Iowa. The new distributor organization will be headed by Cliff Miller, who has handled Caterpillar and allied equipment in this territory for twenty years, as General Manager. M. Lee Coonan, a former district representative for LaPlant-Choate Mfg. Co., will be the Assistant Manager and Clare Fintzell will be Sales Manager.

PLAN YOUR HIGHWAY POSTWAR PROGRAM NOW

Include TUTHILL GUARD RAILS *in Your Specifications*

SOUND planning, foresight, wise economy and seasoned judgment are combined when you specify in your Highway Postwar Program the well-known, widely used TUTHILL GUARD RAIL.

TUTHILL convex design and spring-like, deflective action, assure maximum safety, exceptional visibility, attractive appearance, economical installation and low-cost maintenance.

Be sure to include the TUTHILL Guard Rail in your Postwar Plans for Highway Safety.

Pacific Coast Manufacturers and Distributors
U. S. SPRING & BUMPER CO., LOS ANGELES, CALIF.

Write for Detailed Specifications

TUTHILL SPRING COMPANY
762 POLK ST... CHICAGO 7, ILL.

"SPRAY MASTER" PRESSURE DISTRIBUTOR

"Spray Master" putting asphalt on a city street. Note the razor-like edges.

This "Spray Master" is ready to put a new surface on one of our vital highways.

It's a proven fact that the "Spray Master" will apply Asphalt, Tar, Road Oil, or Emulsion at a lower cost. Being designed to function without undue gadgets to operate, the "Spray Master" starts and stops the spray instantly—no dripping—no dribbling. For present or post war construction of roads, streets, airport runways, let the "Spray Master" speed up the job. Let it show how easy it is to do more work in less time. "Spray Master" is made in truck or semi-trailer models.

For better highways, use the best in Black Top Equipment—use the "Spray Master" Pressure Distributor.

BLACK TOP ROAD MAINTENANCE EQUIPMENT LB SINCE - 1900 LITTLEFORD

LITTLEFORD BROS., Inc.
485 E. Pearl St., Cincinnati 2, Ohio

Rebuilding and Repair Of Crawler-Wagon Tracks

Two booklets which are particularly timely in view of the scarcity of materials and the necessity for making equipment last as long as possible have been made available by the Athey Truss Wheel Co., 5631 W. 65th St., Chicago 38, Ill. One deals with the repair of Forged-Trak wheels, and is divided into three sections covering instructions for field servicing, complete shop reconditioning, and lubrication. The text of this 37-page booklet is supported by numerous illustrations, and is well indexed so that information regarding specific parts can be quickly located.

The second booklet presents instructions for rebuilding Athey Forged-Trak tracks and in a foreword gives a brief resume of their construction which will help the user to recognize when and under what conditions rebuilding is advisable. The entire reconditioning operation is explained, with photographs, beginning with the removal of track plates and ending with the building-up and grinding of track links before reassembly.

Copies of Field and Shop Repair of Athey Forged-Trak Wheels and Instructions for Rebuilding Athey Forged-Trak Tracks may be secured upon written application to the manufacturer.

Lindsay Succeeds Moore At Universal Atlas Cement

Announcement has been received from the Universal Atlas Cement Co., New York City, United States Steel Corp. subsidiary, of the appointment of George L. Lindsay to succeed O. L. Moore as Director of Tests and Research. Mr. Moore, who directed important research work in the development of testing techniques in studying the characteristics and properties of cement and concrete, and was responsible for other important developments in the field, is retiring after thirty years of service with the company.

Mr. Lindsay was associated with Universal Atlas Cement before entering the University of Minnesota, and upon graduation rejoined the company, serving successively as Chemist, Engineer with the Inspection Bureau, and Engineer of Tests. During recent years he has held the position of Assistant Director of Tests and Research. He is a member of the American Society for Testing Materials and of the American Concrete Institute and its Committee 714.

ADNUNS LAY WORLD'S TOUGHEST TRACK

Track layout showing pavement varying from 30' to 60' wide. Super elevation on curves. Each tank runs 50 miles at speeds up to 30 M.P.H.

Tanks are tested day and night. Flexible bituminous pavement adjusts itself to heavy blows of treads without break in pavement.

Adnun laying last of four courses each 1½" thick and 10' wide on stabilized base. No forms needed. Parallel strips firmly compacted together.

Thirty-ton tanks, grinding their macerating way around and around the Chrysler testing track in Detroit, reduced to rubble all roads until one of asphaltic concrete was built last year. It has proved to be resilient and rugged enough to withstand the heavy blows of the treads without permitting a break in the pavement, standing up where all others failed.

Two Adnun Pavers put down the 6-in. black top surface on this toughest of tracks—30,000 sq. yds. (9,000 tons) of hot-mix, hot-laid asphaltic concrete—in four courses of 1½ in. each. Results proved again the quality of Adnun work—maximum density, tight joints between strips, smoothest finished surface, all-weather durability against either rubber-shod or steel-shod treads. Adnun Black Top Pavers were the first in the field. They are the first in performance today. Continuous Course Correction, an exclusive Adnun feature, makes it possible to lay each course more smoothly than the preceding one. This gives better material control and insures maximum density in the pavement. Overlapping action at the Cutter Bar assures a tight joint at the curb or against the paralleled course, thus making forms unnecessary.

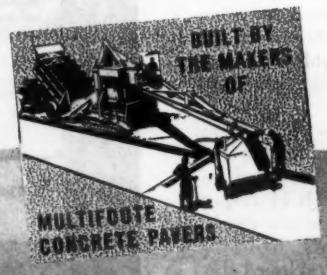
Send for the new catalog describing the newest features that make Adnuns more usable and productive than ever. Learn how the Power Cut-Off and Hydraulic Control insure higher production by providing fatigueless operation.

Write today. No obligation.

THE FOOTE COMPANY, INC., NUNDA, N. Y.

The World's Largest Exclusive Manufacturers of Concrete and Black Top Pavers

ADNUN
TRADE MARK REGISTERED
BLACK TOP PAVER



WITH CONTINUOUS COURSE CORRECTION

Buying Right-of-Way For Post-War Roads

Complete Arrangements Made And Land Acquired by Minn. Dept. of Highways; No Delays When Construction Approved

✦ POST-WAR planning in Minnesota means acquisition of right-of-way as well as preparation of plans and specifications. When the day arrives on which highway construction will be called upon to do its part to provide both direct and indirect employment as well as creating a demand for capital goods, there need be no delay in Minnesota while it is being determined what land shall be used and how much it shall cost. Minnesota now has title to lands on which construction valued at several million dollars will be carried on, improving trunk routes as well as building many miles of rural highways.

Customary procedure is to purchase a right-of-way 150 feet wide for two-lane highways, while 225 feet of width is ordinarily secured when the improvement is for four-lane divided highways. Economy in land use is achieved where long slopes can be extended outside these limits by securing a slope easement whereby the property owner, after construction has been completed, may re-occupy the portion of the slope outside the regular right-of-way so long as the use to which he may put it does not jeopardize the security of the highway.

Development of the limited-access principle, which is now given consideration in right-of-way needs on all important highways, has been a gradual evolution in Minnesota. No legislative action has ever been taken on the matter but the Attorney General has ruled that the Commissioner of Highways has the right to restrict access on trunk highways. Court decisions have upheld the principle and, by gradually educating the public to the value of limited access, a spirit of cooperation has been created so that the principle is generally accepted without protest.

Although in many cases limited access is considered by the Department to be a necessary protection to the investment of state and Federal funds in the highway system, considerable forbearance has been exercised in the use of this feature and all practical consideration has been given to the local conditions. Where limited-access highways are built, the Department has benefited, in addition to the general features of safety and roadside control, through the elimination of frequent demands for the construction of driveways and cross-ditch drainage structures.

Procedure

As soon as the planning of new work has proceeded sufficiently to determine the right-of-way needs of the project, a map showing these needs is prepared by the Plans and Surveys Section of the Department of Highways and transmitted to the Engineer of Lands and Right-of-Way for appropriate action.

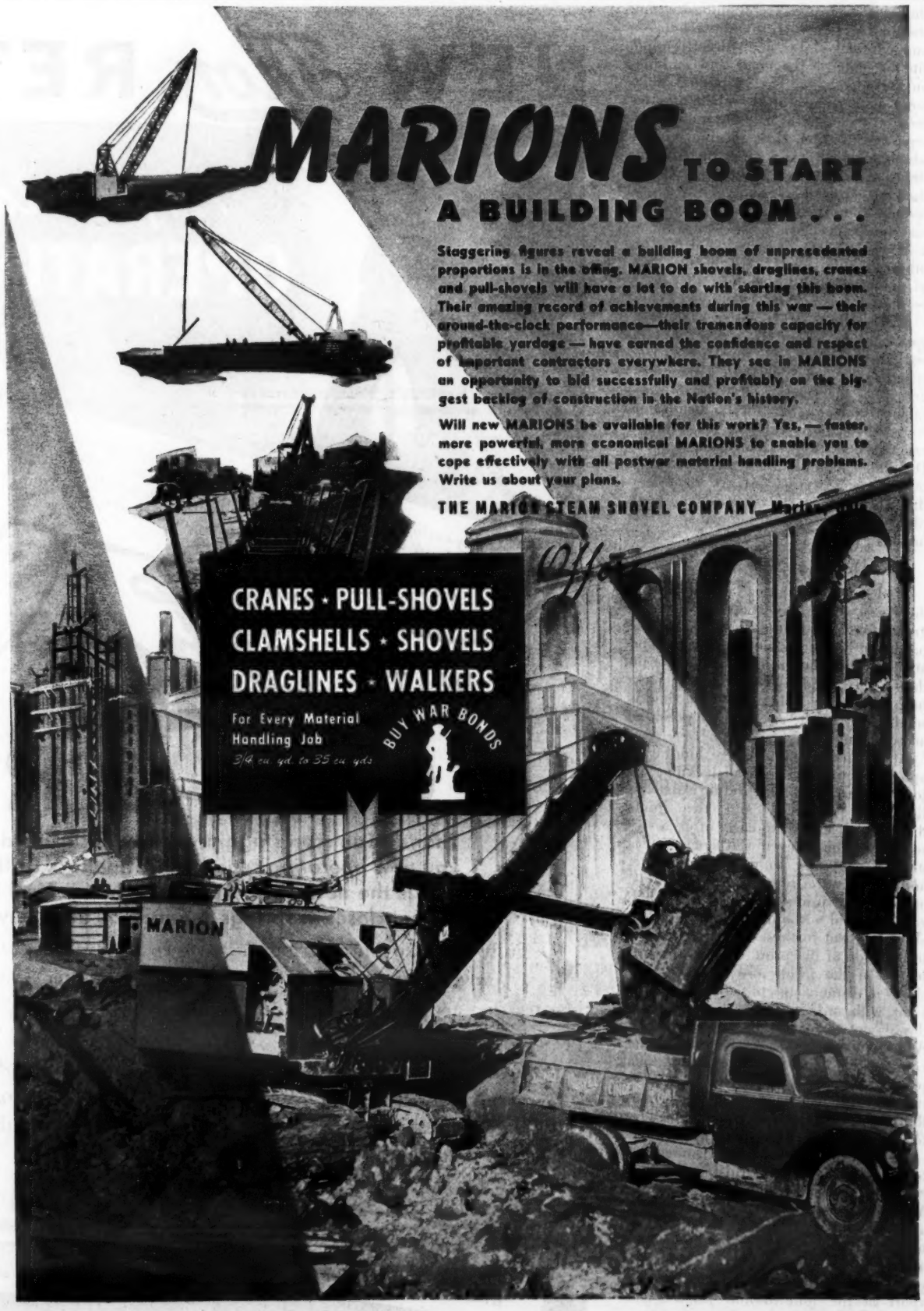
This section of the Department, headed by S. Rex Green, Engineer of Lands and Right-of-Way, and staffed by a group of specialists in right-of-way problems, goes into action. This division of the Department of Highways is employed primarily with the acquisition of new rights-of-way and also handles purchase of gravel pits, hauling rights across private property and similar related matters for the maintenance and construction divisions.

A request for authority for acquisition of right-of-way is first prepared, to which is attached a detailed right-of-way map of the project, all legal and engineering items noted on this form being carefully checked by men familiar with the questions involved. The District Engineer makes his recommendations, as do other heads of divisions affected and finally, upon approval by the Commissioner of Highways, the executive head of the Department under the Minnesota organization, the form becomes authority for preparation of his orders establishing the trunk highway.

These orders are also prepared by Mr. Green's office and make the rounds of the affected divisions, accompanied by a check list on which approval of the Commissioner's orders is indicated. Under decision of the Minnesota courts, the Commissioner of Highways' center-line and width orders establish the necessity for the taking of the lands to be acquired. Only after this careful check has insured the correctness of all fundamental data are the orders requesting condemnation transmitted to the Attorney General.

The Attorney General's office then proceeds with the legal details. A condemnation petition is filed with the District Court which makes the land immediately available for use by the Department of Highways. All necessary engineering assistance is provided by the Engineer of Lands and Right-of-Way. Although the filing of the petition with the District Court makes the land immediately available if desired, the damages involved have to be ascertained. Three commissioners, who must be residents of the county where right-of-way is desired, are appointed by the Court without dictation from either party to the issue, but ordinarily with some regard to the desires of the state and the landowners in the matter. Commissioners receive a per diem and expenses for the time actually spent in performing their work and proceed immediately to inspect the affected lands and hold hearings before rendering their decision. Both parties may be heard publicly and the decision of the commissioners becomes a matter of public record. If no appeal from the decision is made within thirty days, it becomes binding on both parties and payment of damages follows in short order. If an appeal is made, it does not abrogate the right of the Department to enter upon and use the lands

(*Concluded on page* 68)


MARIONS TO START A BUILDING BOOM . . .
Staggering figures reveal a building boom of unprecedented proportions is in the offing. MARION shovels, draglines, cranes and pull-shovels will have a lot to do with starting this boom. Their amazing record of achievements during this war — their around-the-clock performance—their tremendous capacity for profitable yardage — have earned the confidence and respect of important contractors everywhere. They see in MARIONS an opportunity to bid successfully and profitably on the biggest backlog of construction in the Nation's history.
Will new MARIONS be available for this work? Yes, — faster, more powerful, more economical MARIONS to enable you to cope effectively with all postwar material handling problems. Write us about your plans.
THE MARION STEAM SHOVEL COMPANY
CRANES · PULL-SHOVELS
CLAMSHELLS · SHOVELS
DRAGLINES · WALKERS
For Every Material Handling Job
3/4 cu. yd. to 35 cu. yds.
BUY WAR BONDS
MARION

NEED A BIG Trailer?

La Crosse Makes Them Up To 200 Ton Capacity

** WRITE OR WIRE **

LA CROSSE TRAILER & EQUIPT. CO.
LA CROSSE, WISCONSIN U. S. A.

Mud-Jack Operations On Connecticut Roads

(*Continued from page* 39)

harsh mix, or when the subgrade of the pavement is so sandy that it will filter water from the mix.

Drill Holes for Mud-Jacking

The drill holes through which the nozzle of the Mud-Jack hose is inserted are made just large enough for a snug fit with the nozzle which discharges the mix. The holes are usually 2½ inches in diameter. The spacing of the holes is very important and depends not only on the size, shape and type of settlement to be jacked, but also on the condition of both pavement and subgrade. As a general rule, holes are drilled on 5-foot centers along lines 3 feet from and parallel to the longitudinal edges of a slab. No two holes in the same slab, however, should be transversely opposite but should be staggered so that a hole on one side of a slab comes directly opposite the center of the space between holes on the other side. The individual judgment of the operators is relied upon to modify the general rule to meet each separate situation. Hole spacing in slabs which are short, cracked, or of irregular dimensions is varied to fit the shape of the slab. Holes each side of the longitudinal joint between contiguous slabs may not be needed every 5 feet, whereas a sandy subgrade, a sandy mud mix, or other conditions retarding the free flow of the mix sometimes require that holes be placed on less than 5-foot centers.

When filling voids under a concrete pavement in which there has been no settlement, Mud-Jack operations are preceded by a careful study of winter frost heaves, of the reaction of slabs to traffic impact, and of other similar conditions so as to locate as fully as possible the exact position and extent of such voids. Drill holes then are not placed according to any general rule, but are located so that all parts of all voids can be completely filled without in any way disturbing existing pavement grade.

Jacking Operations

Mud-Jack operations are generally done first where pavement settlement is greatest so as to bring the surface of the pavement into a position parallel to and at a lower level than its final position in the finished grade. The amount of jacking done at any hole at any one time is small, to prevent, as much as possible, any cracking of the pavement.

At expansion joints where binding is apt to occur during Mud-Jacking, all joint material, either prefabricated or liquid, is removed and the joints thoroughly cleaned. In cases of excessive settlement, or uneven settlement, it is usually necessary to cut the concrete, and possibly the reinforcing or dowels, at expansion joints so that a given slab can be raised without moving adjoining slabs. The cut in these cases is confined to one side of the joint, extends the full length of the joint, and is kept at as short a distance as possible from the joint with only enough steel work or dowels cut to insure successful jacking. As nearly as possible, the cut edge of the concrete is kept in a vertical plane parallel to the original joint. After jacking is completed, the joints are resealed thoroughly with prefabricated joint material and liquid bituminous filler.

Mechanical jacks are used sometimes to aid Mud-Jacking in raising the free edge of a slab and in other similar work. Mechanical jacking must proceed slowly and the voids created thereby filled immediately with mud. Hooks and tackle are used with a truck to pull slabs together which, in settling, have spread apart at the longitudinal joint. Such pulling together is done in conjunction with Mud-Jack operations at a time when the slabs are well cushioned with wet mud but not fully restored to correct grade.

When a very wet subgrade or other condition makes it advantageous to keep traffic from running over newly Mud-Jacked pavement, single lanes of pavement are barricaded for 24 to 48 hours, either between successive operations or immediately after completion of operations.

Mud-Jack operations are not considered complete until (1) abutting shoulders of the roadway have been brought to correct grade and have been properly surface-treated, (2) disturbed joints have been thoroughly sealed as required, and (3) drill holes have been completely filled with fine-graded bituminous patching material.

The Indiana State Highway Commission contracted for a total of almost 117 miles of highway maintenance in March of this year, at a total contract price of approximately $1,980,299.

Pressed Plate Sections Made in One Operation

The installation of a new 36-foot hydraulic press, by means of which plates can now be pressed to accurate dimensions, in one operation, up to 36 feet or even longer, as well as in a wide variety of special shapes, has been announced by the Fort Pitt Bridge Works, Oliver Bldg., Pittsburgh, Pa. A new bulletin making the announcement states that sections which were formerly built up by welding can now be designed and pressed from plates up to more than 6 feet x ¾ inch thick, and that load-carrying plates which formerly required stiffeners can be pressed into load-carrying shapes, with a saving in weight and fabrication.

Copies of the bulletin "Pressed Plate Sections" may be secured direct from the Fort Pitt Bridge Works.

Victory PARA-PLASTIC

Manufactured by SERVICISED to conform to Federal Spec. SS-F-336 and C.A.A. Spec. P-605, *Para-Plastic* is recognized in the concrete construction field as the one-time sealer for long-time service in Expansion and Dummy joints.

Pioneers in the manufacture of Approved Construction Materials for over twenty-three years.

SERVICISED PRODUCTS CORPORATION
6051 West 65th Street Chicago 38, Ill.

NEW *Thor* RETAINER

...provides NEW OPERATING SPEED
Fully-enclosed to prevent clogging . . . to function smoothly for the life of the tool, the springs in this new Thor Retainer now give you longer, steady "cushioned" action on operations typical of the above — where the shock of removing the drill from a hole is absorbed.

WITH *Thor*

ROCK DRILLS

Thor design scores again with an *exclusive* development to bring you *new operating speed* with Thor Rock Drills.
It is the new Thor "Spring Cushion" Steel Retainer which now *fully encloses* its springs to bring you these new *speed* advantages:

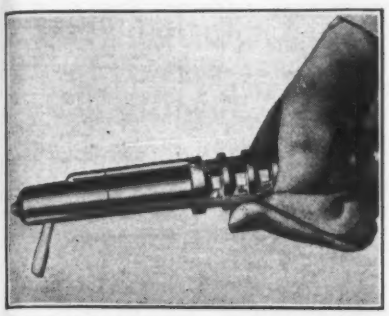
✔ Fully enclosed Thor springs *last longer . . . save you time and maintenance cost,* because they are protected from dirt and other particles to prevent clogging.

✔ Fully enclosed Thor springs *retain longer, steady "cushioning" action* because they are sealed at proper tension inside a steel cap that is part of an inherent retainer design preventing them from being overtightened by the operator or repairman.

✔ Fully enclosed Thor springs *help you work faster . . . longer* because this same principle of *steady tension* makes the spring-attached locking device easier to operate in removing the drill shank from the tool under operation.

For full information about these new, improved Thor Sinker Rock Drills write today for Catalog 42A.

Thor Portable Pneumatic and Electric Tools
INDEPENDENT PNEUMATIC TOOL COMPANY
600 W. JACKSON BOULEVARD, CHICAGO, ILL.
Branches in Principal Cities



The new Rod Saver electrode holder recently announced by Martin Wells.

New Electrode Holder With Insulator Cap

A reinforced snap-on insulator cap is one of the features of the new Rod Saver, the latest addition to the line of welding electrode holders made by Martin Wells, 5886 Compton Ave., Los Angeles 1, Calif.

This insulator cap is made of heavy plastic with a reinforced jacket, and is notched on the inside so that it slips over the vise body and is held securely in place by a steel spring. No screws are required to hold it, hence there is no danger of arcing due to contact with exposed screws. The insulator can be replaced easily and quickly right on the job by breaking the damaged insulator with a chipping hammer and snapping a new one into place.

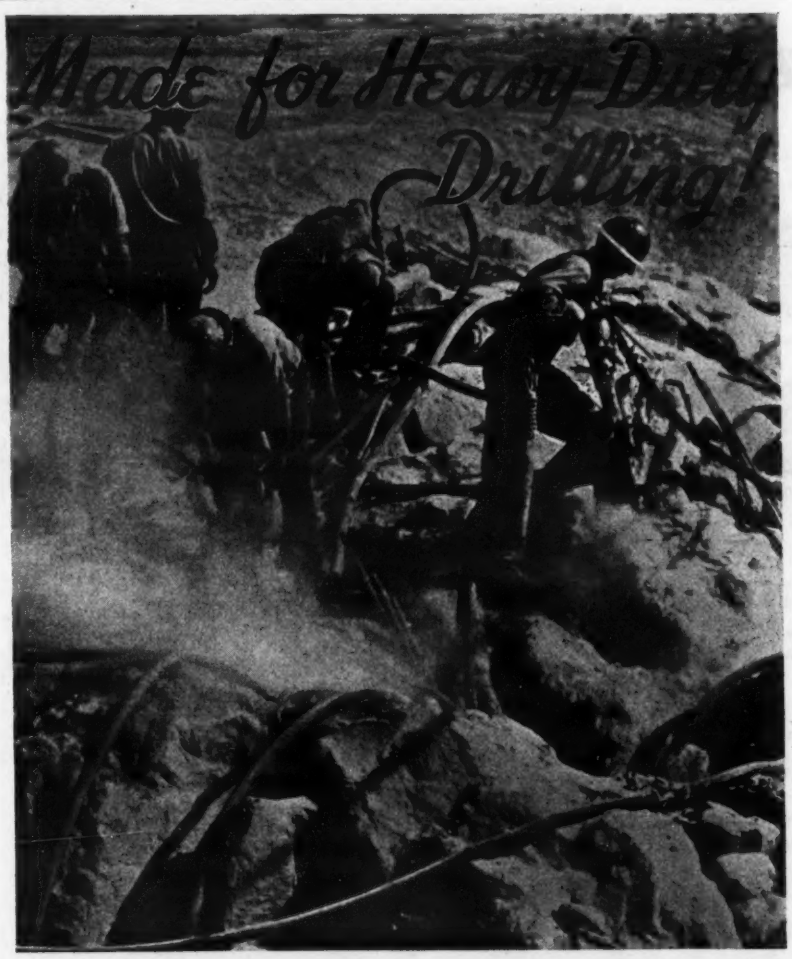
The new Rod Saver rod hole is set at a 60-degree angle, giving the welder greater flexibility and ease in reaching inaccessible and tight corners, it is reported, and it accommodates rods up through 5/16 inch. The vise body provides a positive grip up to 1,000-pounds pressure per square inch, to prevent dropping the rod. Light in weight, the Rod Saver is well balanced to prevent fatiguing the welder's hand.

The Martin Wells line of electrode holders is distributed through welding supply houses throughout the country, and through Air Reduction Sales Co., Lincoln Bldg., New York City, which maintains offices in the principal cities. Further information may be secured direct from the manufacturer or from this magazine.

More Distributors Signed As LeTourneau Dealers

Seven more companies have been added to its new dealer organization by R. G. LeTourneau, Inc., Peoria, Ill. They include the R. E. Brooks Co., New York City; Furnival-Rimmer Co., Philadelphia, Pa.; Dravo-Doyle Co., Pittsburgh, Pa.; Costello Equipment Co., Calgary, Canada; Chicago Construction Equipment Co., Chicago, Ill.; Parker-Danner Co., Hyde Park, Mass.; and Miller-Hasselbach Co., Omaha, Nebr. Each of these companies is represented in the Associated Equipment Distributors, with W. W. Bucher, President of R. E. Brooks Co., of New York City, national treasurer of the AED.

In addition to LeTourneau Tournapulls, Carryall scrapers, 'dozers, power control units, Tournarope, Tournaweld and other LeTourneau products, the new dealer companies will continue to represent other well-known non-competing lines.



"SUBWAY" AIR HOSE

GOODALL'S famous heavy-duty hose for rock drill and other pneumatic tool service. Wrapped duck construction. Tough, durable cover to effectively resist severe abrasive wear. Strong, long-life carcass to withstand rough handling and excessive pressure surges. Synplastic tube for protection against the action of oil. Ask for STYLE D-142, in any size from ½" to 1¼". Maximum lengths, 50 feet.

A GOOD BOOT, TOO!

"Industrial" Brand. Rated tops for quality and comfort. Black, tear resistant rubber, reinforced at bending points. Long-wearing, slip-proof soles. Short, three-quarter and full hip lengths, in all sizes.

GOODALL HOSE, BELTING, BOOTS and CLOTHING

are made to specifications developed through 74 years of manufacturing experience and cooperation with the construction, mining and general industries. Remember . . . if it's Goodall, it's good, longer!

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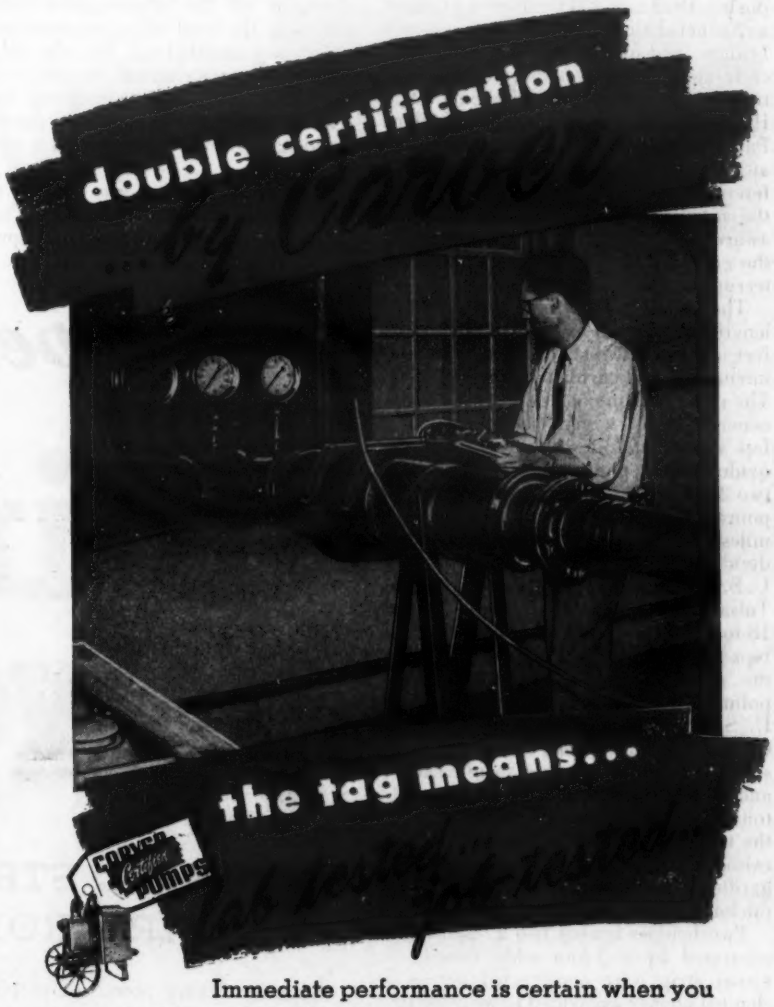
MAIN OFFICE—2 S. 36th STREET, PHILADELPHIA 4, PA.
THE GOODALL-WHITEHEAD COMPANIES
Branches and Distributors from Coast to Coast
Factory—Trenton, N. J. (Est. 1870) 74 Years of "Know How"—Our Most Valuable Commodity



Immediate performance is certain when you send a Carver *Certified* Pump out to a job. No back trips for adjustments are necessary — our laboratory tests make sure of that before a pump goes out.

Longtime performance is sure when you put a Carver *Certified* Pump on those tough jobs. Our on-the-job tests have made sure of that—proved that Carver's simplified design with fewer and sturdier wearing parts will pump more, stand more abuse, last longer.

Get more details about the Carver *Certified* Pumps. A new catalog is now ready. Write today.

THE CARVER PUMP CO.
MUSCATINE, IOWA

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Buy A Share In America
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A Four-Lane Highway Paved in Oklahoma

Two Pavers Operated Side By Side Speed Production On Important Access Road; Sidewalk Poured By Paver

✦ INCREASED traffic to an important war plant near Tulsa, Okla., necessitated the construction of a four-lane highway during 1942 and 1943. Heavy grading, a channel change, the construction of two bridges, and over 3 miles of 5-foot concrete sidewalk were a part of the contracts awarded by the Oklahoma State Highway Commission to the Standard Paving Co. of Tulsa. The work was awarded in five separate contracts at different dates but the same contractor was the low bidder in each case and the award of all contracts to him permitted the construction to proceed without interruption.

The municipal section 1½ miles in length was poured as two lanes, each 22 feet wide with two strips 8 feet wide and having integral curb added on each side. The rural section consists of two 24-foot concrete slabs, with a center section 3 feet wide containing three 6-inch black-oxide stripes, poured later between the two 24-foot slabs. The 3-foot center was poured flush with the outer lanes on 2½ miles of the improvement and as a raised dividing strip on 3 miles. Carrying both U. S. 75 and State Highway 33 east from Tulsa, the new highway replaces an old 18-foot concrete road which was in bad repair as well as inadequate to handle the greatly increased traffic. At the point where the two highways separate, U. S. 75 turning north while State 33 continues east, a traffic circle was constructed with a 150-foot inside radius and 24-foot traffic lanes. Reflector buttons were set in the top of the curb at the traffic circle and in the sides of the raised division strip. All pavement, regardless of the width, is of 9-7-9-inch thickness.

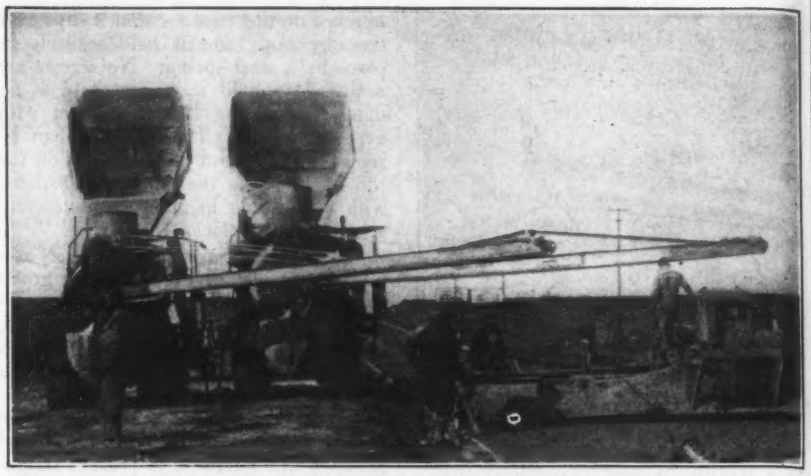
Two bridges having two 27-foot lanes separated by a 3-foot wide raised division strip were constructed across a channel change excavated to increase the discharge of Mingo Creek and improve the highway location. Each bridge consists of 27-inch I-beam continuous spans, two of 56 feet and one of 64 feet.

Preliminary Grading

The old concrete pavement was broken by a 3,600-pound steel ball handled by a P & H skimmer which was also used to load the broken concrete to be hauled away for the repair of washouts on another state highway which had been damaged by the heavy spring floods. Although the haul of approximately 15 miles was rather long, the use of the broken concrete enabled the state to replace the washouts with material more resistant to further erosion than any that could have been obtained from a closer location.

Most of the grading was done by two LeTourneau scrapers pulled by Caterpillar RD8 tractors and two Tournapulls, while a ⅜-cubic-yard Speeder shovel loaded some of the dirt into Ford and Chevrolet trucks for the longer hauls. A P & H dragline with a 1-cubic-yard Page bucket handled much of the wet

(*Concluded on page 76*)



Two Koehring 27-E pavers moved down the subgrade together, swinging their booms over the adjacent lane, on the new four-lane highway serving an important war plant near Tulsa, Okla.

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EIGHT SIZES

Up to 1000 Tons per day

DRYERS

Two-Fire and Internal Fire

30 to 100 Tons per hour

Electric Batch Timers

50 Years' Experience

THE F. D. CUMMER & SON CO.

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For superior

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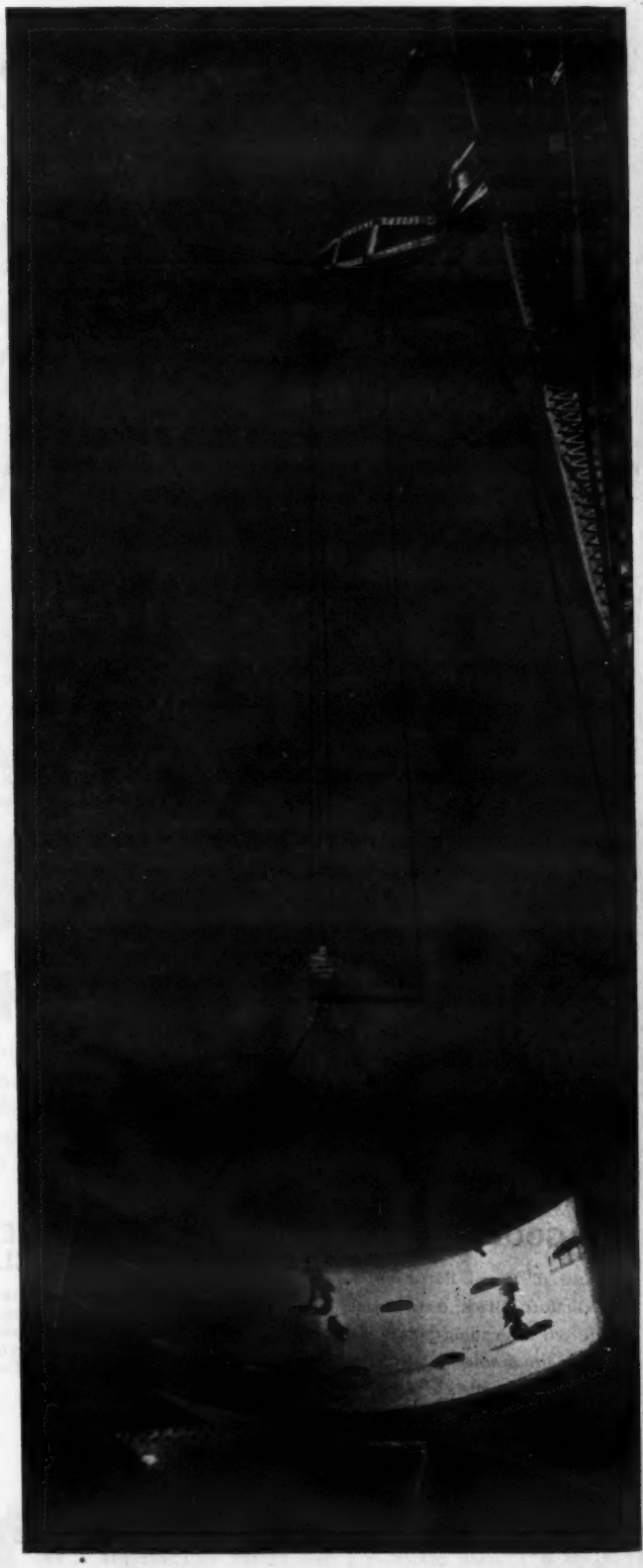

PURPLE STRAND WIRE ROPE

Superior lifting power—and plenty of reserve strength—is what's needed in construction jobs like this one, where giant cranes waft tons of steel through the air.

Lifting power is what Purple Strand has in abundance. This top-quality Bethlehem wire rope is the product of more than fifty years' experience in wire-rope manufacture. It is manufactured under close metallurgical control from blast furnace to stranding machine.

"Purple Strand" means that the rope is made of Improved Plow Steel—the huskiest steel used in any wire rope. For greatest durability and ease of handling, specify not only Purple Strand but "Form-Set"—which means that the wire rope is preformed rope, given its helical shape both in the individual wires and in the strands. Unlike ordinary rope, whose wires contain pent-up stresses and are possessed with a permanent urge to straighten themselves out, preformed rope is stable and relaxed, more resistant to bending fatigue, and much easier to spool and handle.

Make a note to order Form-Set Purple Strand Rope. But order it, please, as far in advance as possible, so that you'll be sure to have it when you need it.

★ ★ ★ BETHLEHEM STEEL ★ ★ ★

Economical Checks For Erosion Control

(*Continued from page 29*)

notch sloped up to the nominal top of the check dam on 1 to 1, with 6 to 1 slope from there to the banks of the draw.

One spillway was completed with the soil-cement alone, while the other three had some gravel compacted with the soil-cement in the top 2-inch layer. On the straight soil-cement spillway, the erosion due to the continuous small flow has been about 1 inch in three months, while the others show no measurable erosion.

Other Uses

There are many grade conditions in highway construction where checks are necessary to reduce the speed of flow in the drainage ditches in highly erodable soils. Wood, concrete, stone and sodded-earth checks have all been used with varying degrees of success. The type of densely compacted ditch check of low-grade local material described is probably the answer to the troubles of many maintenance and roadside engineers. If the natural soil is used without the addition of cement, the densely compacted checks, which are highly impervious, will withstand the erosion of infrequent rains.

Current experiments at Purdue University under the direction of Prof. G. A. Mott on the stabilization of highway shoulders show that it is possible to develop good root growths in well-graded materials with large aggregate and as little as 10 per cent soil. This would lead to the natural conclusion that compacted-earth ditch checks may also be protected against erosion by seeding the top layer of soil prior to compaction.

Personnel

The work described at the U. S. Naval Training Station, Great Lakes, Illinois, was done under the direction of Captain K. B. Bragg, (CEC) USN, Public Works Officer, by Lieut. R. L. Donley, (CEC) USNR.

New Electric Etcher For Marking Tools

A combination etcher and demagnetizer, which will be particularly useful in machine shops to mark small tools and parts with identifying data, has been announced by the Ideal Commutator Dresser Co. With the switch turned to "On", this tool is ready to mark small implements and parts on the work-plate, and a ground clamp is provided for etching parts too large for the work-plate. The etcher is equipped with a Hi-Lo tap, providing a range of fourteen heats for marking iron and steel and their alloys. This heat-resisting etching tool with 5-foot lead has a maximum rating of 1,350 watts. The work plate, which is renewable, is 8¾ x 7¾, and the overall dimensions are 8¼ x 11½ x 8⅝ inches.

Further information may be secured by writing to the Ideal Commutator Dresser Co., 1366 Park Ave., Sycamore, Ill.

Atlas District Office Moves to New York City

The District Sales Offices of the Explosives Department of the Atlas Powder Co., previously located in Philadelphia, have been moved to New York City, and the Sales Office formerly maintained at 60 East 42nd St., New York, will be moved to join the District Sales Offices at the new location in the Empire State Bldg., 350 Fifth Avenue. Atlas will also continue to have a Sales Office at the old address in Philadelphia.

The New York offices will be in charge of W. C. Manning, Assistant Director of Sales of the Explosives Department, who is being transferred to New York from the general offices in Wilmington. He succeeds E. W. Moorehouse who will retire July 1. Mr. Manning, who has been in the explosives industry twenty-five years, was formerly associated with the Grasselli Powder Co., and was with the Peerless Explosives Co. when that company was acquired by Atlas in 1931. Before going to Wilmington in 1942, he was located at the Wilkes-Barre, Pa., anthracite Sales Office of Atlas.

Standard Oil of N. J. Promotes W. P. Headden

William P. Headden has been appointed Assistant Manager of the Sales Engineering Department of the Standard Oil Co. of New Jersey, it was recently announced. Since early in 1943, he has been supervisor of the fuels and lubricants section of the division, having served as assistant supervisor of the section since 1937.

You can't work with prima donnas . . . .

A welding and cutting outfit which fails in an emergency is too great a luxury to own. Sure, VICTOR costs a little more to buy...but it costs so much less to own.

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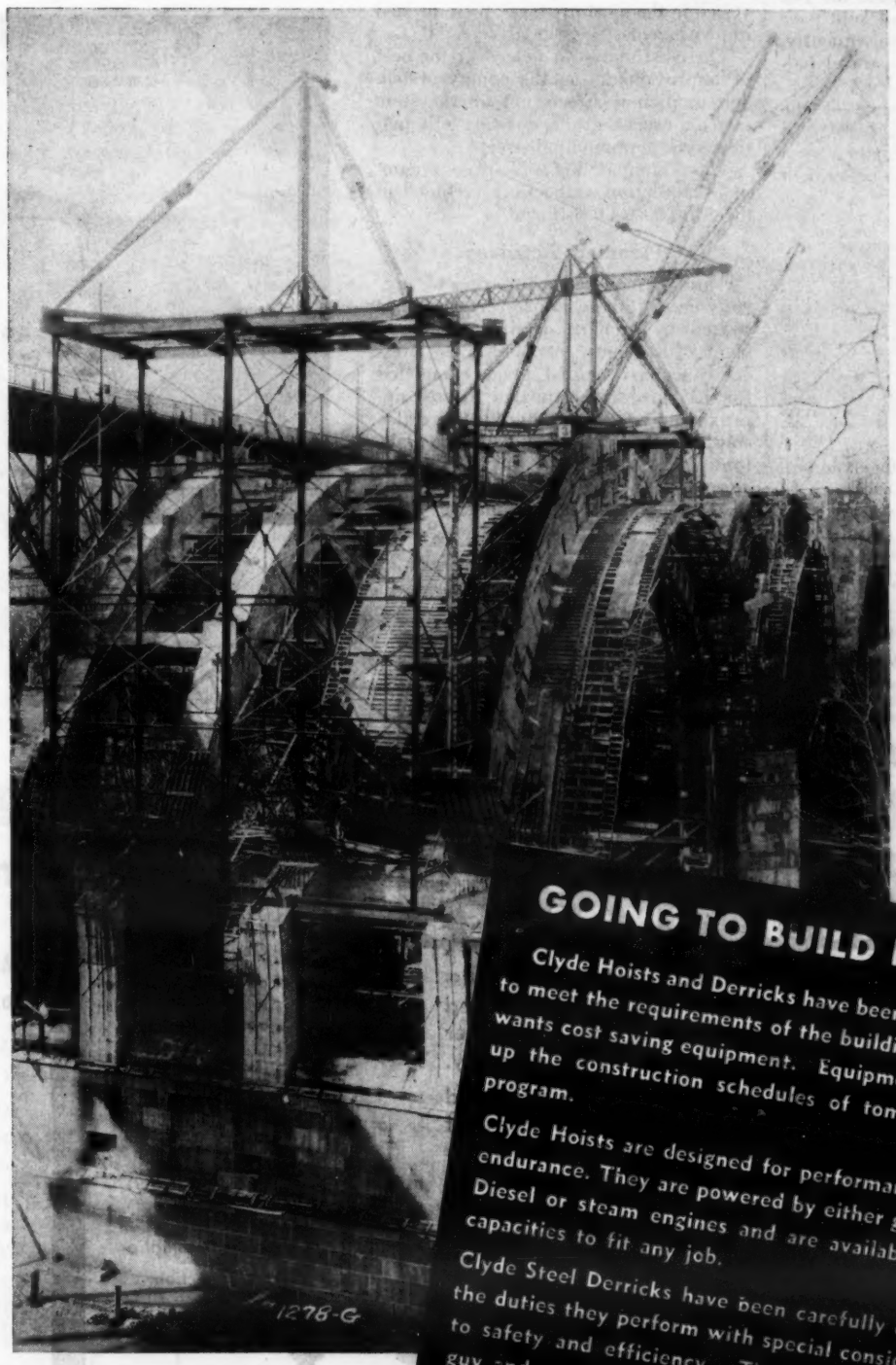

Plan now for the job you'll do tomorrow!

GOING TO BUILD BRIDGES?

Clyde Hoists and Derricks have been specially designed to meet the requirements of the building contractor who wants cost saving equipment. Equipment that will step-up the construction schedules of tomorrow's building program.

Clyde Hoists are designed for performance and built for endurance. They are powered by either gasoline, electric, Diesel or steam engines and are available in sizes and capacities to fit any job.

Clyde Steel Derricks have been carefully engineered for the duties they perform with special consideration given to safety and efficiency. They are available in either guy and stiff leg types in all practical sizes.

Bulletins on every type of Clyde Equipment are yours for the asking. Check their features . . . compare their quality.

CLYDE

CLYDE IRON WORKS, INC.
DULUTH, 1 MINNESOTA

Summary of Needed Work on Ohio Roads

(*Continued from page 40*)

is one of Ohio's greatest problems.

The need for urban development, the continuing of the main highways through municipalities, the location and construction of express ways in the large cities, together with principal feeders, is obviously great in a state like Ohio with so many urban communities, referred to in the first part of this article.

While the state has done considerable work in municipalities, there is no legal requirement that any state highway funds be expended within municipalities. Consequently there has been an accumulating need growing over a number of years. Traffic surveys in Ohio, as in most states, show that a very high percentage of the traffic approaching the larger municipalities is destined to enter the city rather than to by-pass it. The urban developments have not kept pace with the rural system; consequently, some adjustment and more careful balancing of programs are needed.

The agricultural importance of the state and the local markets, as referred to earlier in this report, indicate a need for further development and betterment of its local road systems.

TABULATION OF THE MILEAGES OF THE HIGHWAY SYSTEMS IN OHIO

	RURAL	*URBAN*	*TOTAL*
Interregional	788	246	1,034
Federal Aid	6,133	1,361	7,494
Federal Secondary	6,046	541	6,587
State (Off Federal system)	4,028	380	4,408
TOTAL STATE SYSTEM	16,207	2,282	18,489
Urban Streets (not on State or County System)		15,703	15,703
County Roads	28,352		28,352
Township Roads	41,949		41,949
TOTAL			104,493

While the greater part of the state system has been improved, much of it is obsolete and inadequate, particularly in the urban areas. The county and township systems are partially improved, mostly with low types.

Financing

The state levies, collects and distributes a 3-cent gasoline tax for roads and streets and 1 cent for the general fund. It also levies and collects license fees on all motor vehicles, which go to road and street funds. The distribution is as follows:

	Gas Tax 1½c for Construction (Per cent)	Gas Tax 1½c for Maintenance (Per cent)	Motor Vehicle Tax For Maintenance (Per cent)
State Department	67½	45	23
Counties	7½	25	52
Municipalities	7½	30	25
Townships	17½		

Needed Work

To modernize completely the entire state highway system, both rural and urban, it is estimated would cost $680,000,000. To modernize the system and to extend the arterial routes through the cities, using a modern design, limiting the work to projects justifiable in the immediate and near future, it is estimated would cost $450,000,000. A minimum of $200,000,000 should be invested in the most urgent of these needed improvements.

These estimates do not cover the cost of improvements on the county system and municipal streets not on the state system, except grade crossing elimination work on municipal streets.

The accompanying table gives a complete tabulation of the work included in the $450,000,000 estimate.

Planning Activities

Anticipating such a program of urgently needed highway projects, Ohio has started to prepare detailed plans on many of these projects, and at the present time has detailed plans completed for 125 projects, estimated to cost approximately $22,000,000. There are also substantially completed detailed plans for additional projects that would cost approximately $10,000,000 which will be increased to approximately $60,000,000 by January 1, 1945. (See C. & E. M., May, 1944, pg. 59).

Tabulation of Needed Highway Work in Ohio

	RURAL Miles	RURAL Estimate	URBAN Miles	URBAN Estimate
Interregional	302.070	$ 62,712,700	81.250	$100,759,300
FAP (Not Interregional)	719.479	106,355,450	88.539	54,343,950
FAS (On S. H.)	171.518	15,833,100	14.820	3,775,600
S. H. (Not Federal)	1,210.882	66,704,000	44.750	3,505,000
Subtotal on S. H.	2,403.949	$251,605,250	229.359	$162,384,350
Grade Crossings off State and Federal			23.920	35,055,000
GRAND TOTAL	2,403.949	$251,605,250	253.279	$197,439,350

	TOTAL Miles	TOTAL Estimate
Interregional	383,320	$163,472,500
FAP (Not Interregional)	808.018	160,699,400
FAS (On S. H.)	186.338	19,608,700
S. H. (Not Federal)	1,255.632	70,209,000
Subtotal on S. H.	2,633.308	$413,989,600
Grade Crossings off State and Federal	23.920	35,055,000
GRAND TOTAL	2,657.228	$449,044,600

In addition to this, Ohio is also carrying on an advanced engineering program, affecting principally important projects on the strategic network and Interregional Highway System, which, when completed, will enable the state to proceed with the plan preparation for a large volume of work, highly urban in character. The major portion of this work will be opening up traffic arteries into and through large centers of population, where traffic bottlenecks are now in existence.

Summary

To summarize, the Ohio highway problem, in order of importance, can be properly placed under three general classifications:

1. Construction of expressways necessary to carry large volumes of traffic between and into densely populated areas.
2. Correcting deficiencies on the primary highway system.
3. Improving the secondary and rural highway system to standards that will permit rural traffic ready access to the main highways.

Paper is vital to Victory. Turn your waste paper in for salvage.

The HEIL
Cable Power Control Unit
is designed for long-life, low-cost service

- ★ *Gears of forged alloy steel*
- ★ *Gear Case of welded steel*
- ★ *Clutches fitted with moulded linings*
- ★ *Fully automatic brake action*
- ★ *Control Levers easily adjustable to operator's reach.*

Available separately for cable-scraper operation with all makes of tractors

Many features have been provided in Heil Cable Power Control Units to assure increased output and reduced operating expense. The smooth-operating brake and clutch assemblies eliminate shocks and jerks; the large drums run cool; the sheaves are designed to reduce wear on the cables. This adds up to minimum outlay for cable replacement. Fingertip control gives you lightning-fast action with little effort. For sustained high production and lower operating costs, equip your tractors with famous Heil Power Control Units.

R-29

Send for descriptive bulletins.

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is a Production MUST for ALL WISCONSIN ENGINES

Yes . . . even the little Model AA 1 hp., single-cylinder Wisconsin Air-Cooled Engine has its 2¼"-bore cylinder honed to a high mirror finish . . . to assure smooth, full-power operation and maximum fuel and maintenance economy.

No "hidden detail" of design and construction is neglected or sacrificed to "price expediency" in the manufacture of these fine engines. These details are important to YOU in the operation of *your equipment*. Wisconsin air-cooled engine power is the answer.

Most H.P. per pound

WISCONSIN MOTOR Corporation
MILWAUKEE 14, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

Buy U.S. WAR BONDS!
$1.00 Will Buy One Intrenching Shovel

Buy U.S. WAR BONDS!
$10.00 Will Buy One Tent

Bureau of Reclamation Photo

A completed section of the Madera Canal. The installation of emergency gates on the upstream face of Friant Dam (See page 37), part of the Bureau of Reclamation's Central Valley Project in California, will make it possible to deliver irrigation water to the Canal, 25 miles of which will soon be in operation.

Light for Night Work And Emergency Jobs

The need for speed on wartime construction jobs, the urgency for quick repairs in case of a breakdown of equipment, the necessity that the work go on without let-up in case of emergency highway or bridge repair, all require that darkness be ignored until the job at hand is completed. "Turning Darkness into Daylight" is the slogan of the U-C-Lite Mfg. Co., 11 E. Hubbard St., Chicago, Ill., manufacturer of the line of Big Beam portable searchlights.

Available in a number of sizes and styles, these Big Beam lights are self-contained units designed to provide a strong powerful beam of light wherever it is needed, regardless of power lines or the inaccessibility of the job. The Model 700 EH double-duty electric hand "trouble lamp" is particularly recommended for construction jobs and repair work, to light up inaccessible places, for making repairs to equipment, or for emergency work on highways or bridges. Powered by four No. 6 dry cells, it throws a powerful beam approximately 2,000 feet. It has three bulbs, the main bulb, an auxiliary, and a bulb on a 10-foot extension cord. A two-way switch operates the main and auxiliary bulbs independently. The entire unit is packed in a waterproof housing when not in use, and it is equipped with a carrying handle, or with a shoulder strap.

This No. 700 EH and the other Big Beam portable lights are described and illustrated in an 8-page folder, copies of which may be secured direct from the manufacturer by mentioning this magazine.

Arnold Elected President Of Wood-Preservers' Assn.

At the Fortieth Annual Meeting of the American Wood-Preservers' Association in Chicago April 6, Walter P. Arnold, Technical Director of the Koppers Co., Wood Preserving Division, Pittsburgh, Pa., was elected President. For the past two years he has served as Vice President of the Association, which has a membership of over 800 among suppliers and users of treated timber.

Previous to joining the Koppers organization, where he is in charge of all research activities at its twenty-one wood-treating plants, Mr. Arnold was connected with the Pittsburgh Crucible Steel Co. as research chemist.

New Kotal Dealers

Announcement has been received of the appointment of the Lofland Co., Dallas, Texas, as distributor for the Kotal Co. of New York City, to cover the state of Texas. The new dealer is headed by Ralph F. Lofland, who was formerly associated with the Missouri State Highway Department and later with the firm of Black & Veatch, Consulting Engineers, Kansas City, Mo. He is also a past President of the Texas Concrete Reinforcing Steel Institute.

A. V. Polak of Atlanta, Ga., has been named Kotal sales agent for the states of South Carolina, Georgia, Florida and Alabama. Mr. Polak has held important state, county and municipal posts in Missouri, and at one time was associated with the Amiesite Co., Wilmington, Del., as Construction Engineer, and with L. W. Roberts & Co., Atlanta, Ga., architects and engineers. Just prior to his present appointment, Mr. Polak was Assistant Airways Engineer for the Civil Aeronautics Administration in Atlanta.

How Marine Derrick Power Transmission Will Speed the Road Building Program

Several time, labor and expense saving clutch improvements, developed by war emergencies, will be adapted for post-war products. For the duration, some of these improvements are not available in civilian products. But ideas are not rationed. Your future may depend upon re-designing your product for post-war markets. Let our engineers suggest new peace-time clutch applications using

ROCKFORD *OVER CENTER and SPRING-LOADED* **CLUTCHES** *and* **POWER TAKE-OFFS**

SEND FOR THESE HANDY BULLETINS ON POWER TRANSMISSION CONTROL

Every road machinery engineer will want these helpful bulletins for his data file. They tell and show how our engineers have made ROCKFORD CLUTCH and POWER TAKE-OFF applications that are saving time, power and money under adverse operating conditions. They give capacities, dimensions and specifications. Contain applications diagrams, etc.

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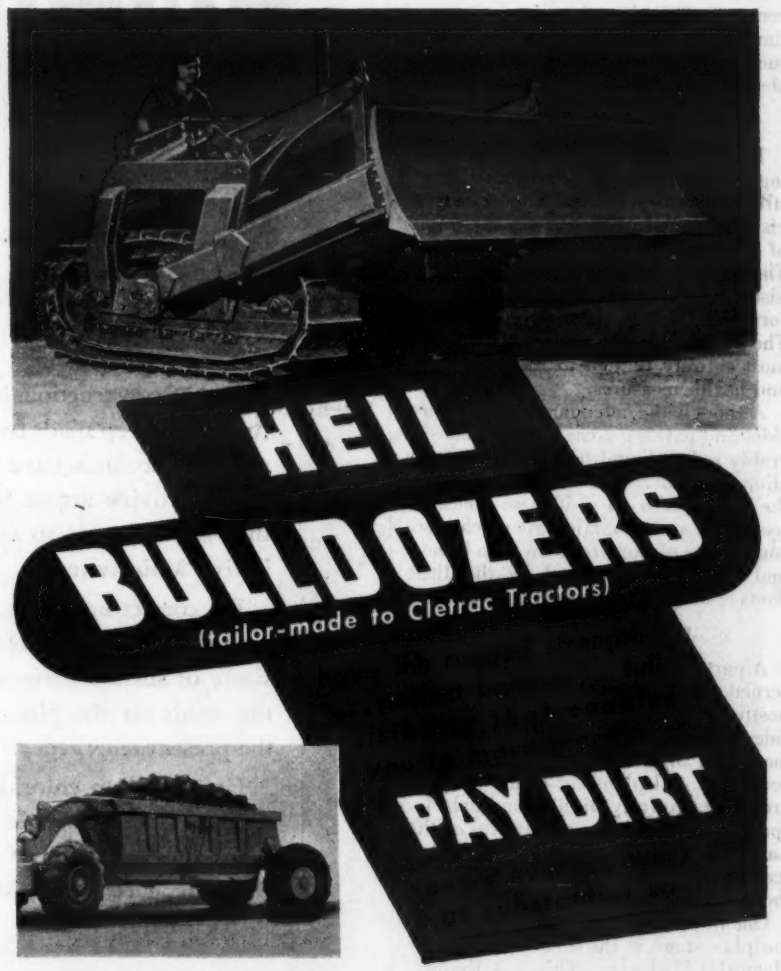
Pullmore Multiple-Disc Clutches • Over-Center and Spring-Loaded Clutches • Power Take-Offs



A Bottom-Dump Trailer Wagon that is breaking all the SPEED records.

High-clearance doors that operate on the clamshell principle, enable your operator to dump and get away in a flash. The doors are *power-opened* — in 2 seconds — under cable control (they *close* by gravity). No doors dragging in the dirt — nothing to slow up the unit. The operator turns off the windrow at sharp angles whenever he chooses — dumping is under fingertip control — all in one heap, or with an even spread that looks almost like the work of a cable scraper. Get a post-war "priority" by ordering now!

Write for bulletins

Sound engineering design, reduced to the utmost simplicity, guarantees few service interruptions and cuts maintenance costs.

Note the operator's unobstructed view and the convenience of the controls that enable him to work accurately with no loss of speed. See how Heil engineers have pioneered the modern practice of replacing heavy cast members with welded box sections that are lighter, stronger, and easy to repair in the field without costly delays.

For full loads and more yardage — at lower cost—use Heil Earth-moving equipment. *Write for bulletins.* R-30

See Your Cletrac Tractor Distributor

THE HEIL
GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

Curtailed Activities; Future Roadside Work

(*Continued from page 19*)

tinue the past practice of reshaping, fertilizing, and seeding steep, raw, eroding slopes. As fast as is practicable, the more critical slopes are being staked and mulched. When cured mowings of legumes or grasses with ripe seed are available, they are used for mulch and do not require additional seeding, but where wheat straw or other mulch is used, it is supplemented by a light seeding. Although this practice does not produce a permanent and desirable sod, it saves considerable labor required for cleaning ditches after every heavy rainfall, and at the same time promotes some fertility in the soil. As far as possible, weak sod is being fertilized, reseeded and mulched.

It has been necessary to reduce and confine tree trimming operations to the removal of dead or dangerous trees and limbs. Tree trimming under permits issued to public-utility companies for wire clearance is closely supervised.

Roadside Parks

In spite of the fact that pleasure driving has been greatly curtailed, there are still motorists who find opportunity to visit the many historic shrines and points of interest for which Virginia is famous. The parking areas adjacent to the many historical markers must be kept uniformly clean and in usable condition. The maintenance of waysides is now almost entirely limited to fire prevention and health measures.

Although the attendance at the waysides and parking areas has been considerably reduced, and policing practically eliminated, it is gratifying to note that the people who do visit these areas for recreation and relaxation are much more considerate of our problems than in normal times, as evidenced by the little damage or nuisance created by them.

Post-War Projects

A part of our current activities is concerned with including in the plans for post-war construction the accepted roadside practices which will produce the maximum in utility, safety, beauty and economy. All plans for future projects are being carefully studied, and field inspections made by representatives of the Landscape Division. All basic landscape features are being incorporated in the plans and specifications.

One of the major post-war projects in the plan stage is the Henry G. Shirley Memorial Highway. This is a limited-access highway which starts at the District of Columbia line and parallels Route 1 for a distance of 17 miles, bypassing the city of Alexandria, Fort Belvoir, and several small communities between the capital city and Occoquan Creek. All slopes on this highway will be 3 on 1 or flatter, and all intersecting roads will be handled by overhead interchanges. A comprehensive study is being made of the entire project, particularly of existing trees and other vegetation. In many places, the dual lanes will be widely separated to protect and preserve groups of trees or other vegetation that will add to the beauty of this memorial highway. Among the landscape items to be included in the project are turfing, planting of trees and shrubs, and development of parking and wayside areas, all of which will be chosen for their natural characteristics. A similar post-war project, which will include intensive landscape treatment, will be the by-pass on U. S. 1 around the city of Fredericksburg.

The wider rights-of-way policy adopted by the State Highway Commission, which changed the 50-foot two-lane highway right-of-way to a width of 110 feet and the four-lane or divided highway to 160 feet or more, will help materially in developing more harmonious roadsides on new projects. These widths

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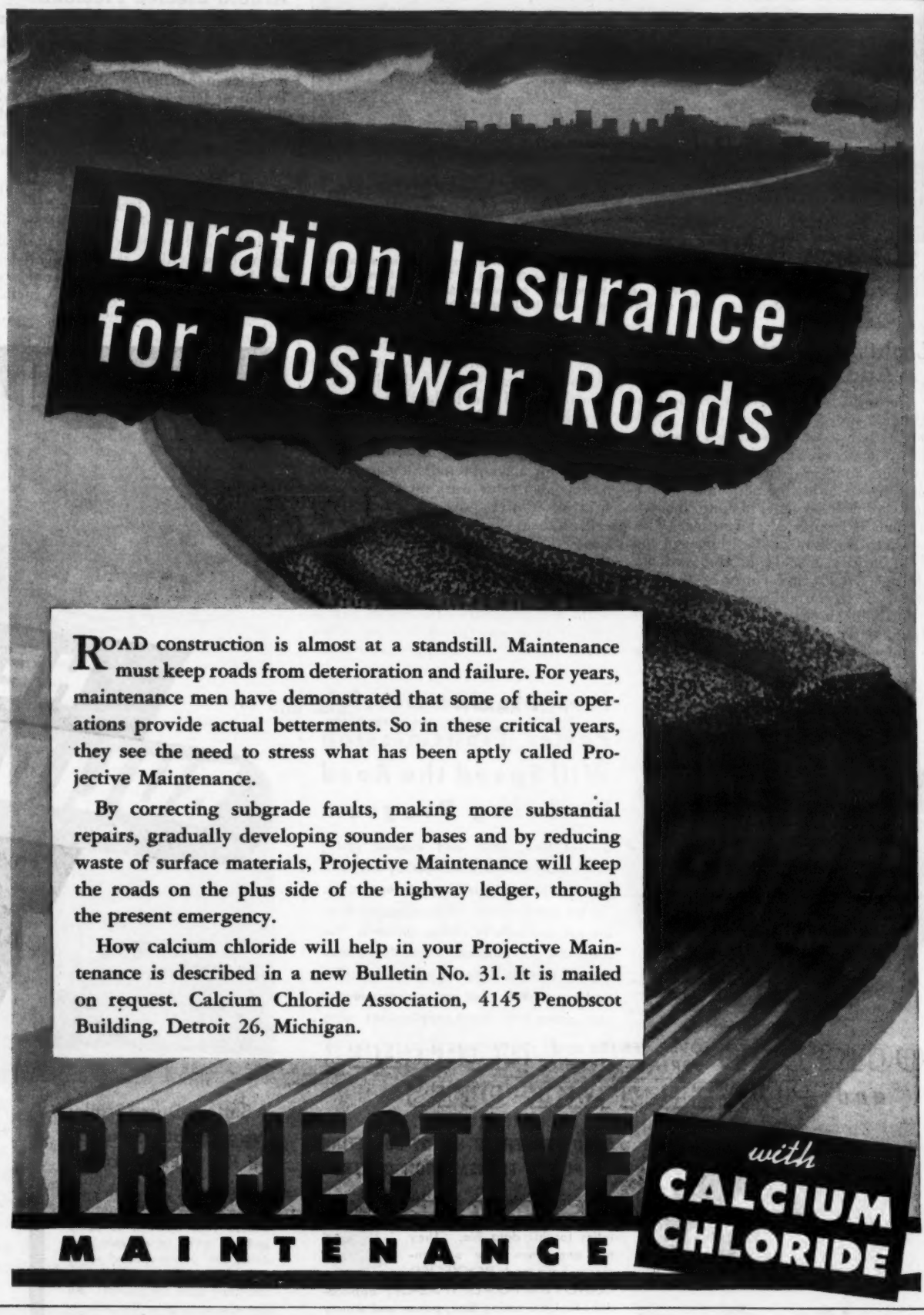

Duration Insurance for Postwar Roads
ROAD construction is almost at a standstill. Maintenance must keep roads from deterioration and failure. For years, maintenance men have demonstrated that some of their operations provide actual betterments. So in these critical years, they see the need to stress what has been aptly called Projective Maintenance.
By correcting subgrade faults, making more substantial repairs, gradually developing sounder bases and by reducing waste of surface materials, Projective Maintenance will keep the roads on the plus side of the highway ledger, through the present emergency.
How calcium chloride will help in your Projective Maintenance is described in a new Bulletin No. 31. It is mailed on request. Calcium Chloride Association, 4145 Penobscot Building, Detroit 26, Michigan.
PROJECTIVE MAINTENANCE
with CALCIUM CHLORIDE

RAPID DUMPING FOR HI-SPEED

In digging and material handling, too, rapid discharge of the load is an essential feature. Every Owen Bucket is designed to incorporate rapid discharge operation—a factor responsible for their outstanding performance.

THE OWEN BUCKET CO.
6030 BREAKWATER AVE., CLEVELAND, O.
BRANCHES: New York, Philadelphia, Chicago, Berkeley, Cal.

OWEN BUCKET
A MOUTHFUL AT EVERY BITE

Change of Address

(Mail to Contractors and Engineers Monthly, 470 4th Ave., New York 16, *today*)

From _____
(Former address)
_____
_____

To _____
(New address)
_____
_____

Name_____
Firm_____
Position_____

Sign Control Improves Roadsides of Virginia

(*Continued from preceding page*)

allow for much flatter slopes and more complete landscaping. Both horizontal and vertical curvatures are being reduced to a minimum. Greater opportunities are allowed for preserving and protecting both individual trees and groves.

Aerial photographs will be of great help in selecting alignment that will preserve trees, locate suitable waysides and scenic-vista turn-outs, and protective strips along streams and other waterways. Studies are being made to provide bordering service roads and areas for public-utility installations, and at the same time furnish insulating strips for the planting of trees and shrubs to screen unsightly poles, billboards, automobile graveyards, dumps, and other eyesores so prevalent along narrow highways, especially near cities and towns.

Through the cooperation of the Virginia Forest Service, a portion of its nursery at Charlottesville is being used to grow roadside trees for the future. Each year from 5,000 to 10,000 trees will be added to the nursery, and in the course of a few years we shall thus have a normal supply with which to embellish new roads as they are constructed.

Signs Along the Highways

The routine activities of the Landscape Division also include vigilant control of illegal outdoor advertising bordering the highways. The countryside of Virginia shows the effects of the outdoor advertising legislation enacted in 1938, as since that time over 200,000 signs and billboards have been removed. The war is making its contribution to this cause, as each year the number of permits issued for billboards is materially decreasing. In addition, many filling stations and rural stores have been closed, and all of these are immediately cleared of unsightly signs.

Landscape forces are also supervising the erection and maintenance of all traffic signs. In order to help the tire and gasoline situation and prevent unnecessary travel, new route markers and traffic signs are being installed through all cities and towns. New types of advance warning and confirmatory traffic signs are also being installed at all major intersections.

Although billboards and traffic signs are very remote from the planting of trees, shrubs and turf, they play an important part in roadside appearance. Advantage is being taken of every opportunity to remove or screen eyesores or to install neat and orderly traffic signs, in order that our roadsides may be ready for the pleasure seekers who will look for relaxation and recreation on our highways after victory has been achieved.

Repair Equipment For Tires and Tubes

Speaker Match Patch vulcanizing units for the repair of tires and tubes are now available in four-way sealed service packages which the manufacturer believes offer a number of advantages to the user. These Match Patch units are designed to provide quick simple vulcanized repair because each patch automatically vulcanizes for the right length of time, welding itself permanently to and becoming an integral part of the tube, it is stated.

The new four-way sealed package provides extra protection to these patches, as each Match Patch is hermetically sealed in an individual packet of moisture-proof transparent film; then ten Match Patch units are placed in a specially treated moisture-repellent package which is then hermetically sealed; and five of these sealed cartons are packed in another specially treated moisture-repellent master carton. Thus, positive protection against deterioration is provided by this four-way sealing plan, and when the package is opened to use one or two Match Patches, the others remain protected from air and moisture.

Further information on these Speaker Match Patch vulcanizing outfits for both natural and synthetic rubber may be found in a new wartime catalog, copies of which may be secured direct from J. W. Speaker Corp., 3059 N. Weil St., Milwaukee 12, Wis., by mentioning this item.

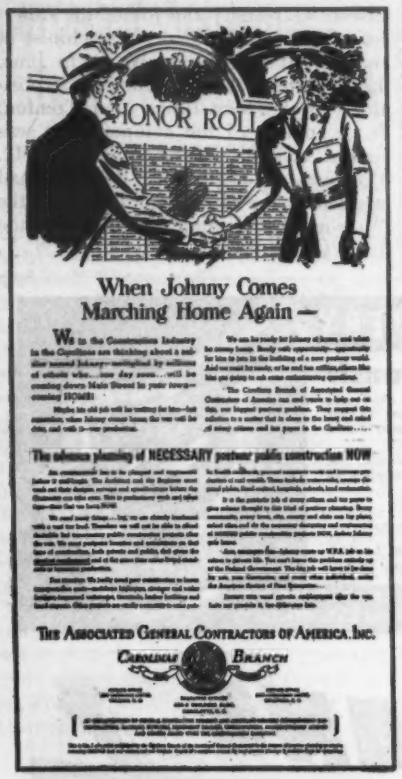
Personnel Changes At American Steel & Wire

Announcement has been made of the appointment of George H. Rose as Assistant to the Vice President of the American Steel & Wire Co., Cleveland, Ohio, a subsidiary of U. S. Steel. He will be succeeded in the position of Chief Engineer by Eugene J. Reardon. Mr. Rose, whose association with American Steel & Wire dates from 1905, started as a draftsman at the Newburgh Steel Works in Cleveland and later became Chief Draftsman at the Central Furnaces in Cleveland. He entered the Construction Engineering Department in Pittsburgh in 1917 and in 1926 returned to Cleveland as Assistant Construction Engineer. He became Chief Engineer in 1937.

Mr. Reardon is an alumnus of Northeastern University and joined the American Steel & Wire Co. as a machinist at the New Haven, Conn., Works in June, 1922. After holding a number of positions in the New Haven and Trenton, N. J., plants of the company, he was named Assistant Chief Engineer in 1942. Previous to 1922, Mr. Reardon had worked at the Geometric Tool Co., the Winchester Repeating Arms Co., and the Lane Construction Co. at Gilboa, N. Y.

IMMEDIATE DELIVERY
UNIVERSAL Level-Transit
Telescope 12" long, 25 power—Horizontal Circle 4½" with vernier to 5 minutes—Vertical Arc 3"—Clamp and Tangent Screw for Vertical and Horizontal Limb—Instrument weighs 11 pounds, tripod 9 pounds.
Price complete with Tripod, Carrying Case, Sunshade, and Dust Cap $115.00. Can be furnished with a compass at $12.50 extra—Stadia Wires $5.00 extra.
ORDER BY MAIL
Expert Repairing of All Makes of Instruments
FREE Interesting Book—"How to Layout Building Lots"—Free—Write Today
DAVID WHITE CO. 305 W. COURT STREET MILWAUKEE 12, WIS.

CRUISER CRANE
PROVIDES SPEED AND MOBILITY
Mounted on eight rubber tired wheels and driven directly from the crane engine, the "Cruiser Crane" can traverse long or short distances swiftly and easily. One man can operate the crane and drive it from job to job without leaving his seat in the operator's cab. This saves considerable time on jobs where frequent short moves back and forth are required. The "Cruiser Crane", because of its short turning radius and easy maneuverability works well in cramped quarters.
KOEHRING COMPANY Milwaukee 10, Wis.
. . . DEPEND ON YOUR KOEHRING DISTRIBUTOR to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.
ARMY E NAVY
KOEHRING HEAVY DUTY
HEAVY-DUTY CONSTRUCTION EQUIPMENT


HONOR ROLL
When Johnny Comes Marching Home Again —
The advance planning of NECESSARY postwar public construction NOW
THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA, INC.
CAROLINAS BRANCH

The second ad in the Carolinas Branch newspaper campaign to impress the public with the importance of planning now for post-war construction.

Blum Named Manager Of P&H Crane Sales

Announcement has been made by Harnischfeger Corp., Milwaukee, Wis., of the appointment of Frank M. Blum as Manager of the P & H Crane Sales Division, to succeed Ben Van Horn who has retired. Mr. Blum joined the Harnischfeger organization in 1929, working on the layout and design of motors, brakes and controls of all-electric heavy-duty hoists, and subsequently he became Chief Draftsman for the development and application of electrical equipment for all P & H products. He has also contributed to the development of such improvements as full-magnetic variable speed push-button control, solenoid-operated crane brakes, dynamic load braking, etc., for overhead traveling hoists, as well as all-welded construction of alloy steels. Prior to his association with Harnischfeger, Mr. Blum was with Cutler-Hammer for seven years.

Newspaper Ads Urge Post-War Planning Now

(*Continued from page* 30)

portunity to step in and inaugurate a government-financed, controlled, and planned local public construction program, if there has been no local planning already done by communities. Therefore, we must urge local planning in our communities in terms of blueprints, for the day our service men return looking for jobs in private industry.

3. By the time the war is over, there will be a vast store of equipment, partly idle, but most of it ready to go to work on a moment's notice, if there are enough projects planned to use it. Therefore, construction can offer a quick solution to local unemployment which should be of interest to local post-war planners.

4. If only a part of the intended goal is accomplished, the program will serve in very large measure to help preserve the contract system and stop, before it gets started, any trend back to a "made-work" day-labor program.

Promotional Material

The first newspaper advertisement in the series, headed "Blueprints for Peace", stressed the importance of the preparation of plans and specifications now, in order to have jobs ready and waiting for returning service men, and the contribution which the construction industry can make to the solution of the post-war unemployment problem. The second advertisement, carrying out the same theme, was headed "When Johnny Comes Marching Home Again" and depicted an American business man welcoming home a returned soldier. In both of these ads, copies of a complete manual for local post-war planners was offered free for the asking.

The initial folder for direct mailing was also entitled "Blueprints for Peace —How You Can Help Stimulate Post-War Planning in Your Community in Terms of Plans", with a legend across the bottom of the cover reading "Take Post-War Planning Out of the Blue Sky Into the Blueprint Stage". Each page of this 8-page folder, printed in black on white paper, with ample use of blueprint blue, discusses one phase of the problem, such as what we are up against regarding post-war employment, what necessary public construction offers locally in the way of immediate and large-scale opportunity, making a survey of community needs in the way of new or improved public works, how we can get started and who is responsible, where the general contractor comes into the picture, and a discussion of the system of free competitive enterprise vs a glorified WPA. On the back cover, the office of the Carolinas Branch of the AGC is offered as a clearing house for information on the subject of post-war planning for public construction, making available the material which the Branch has collected on the experience of communities which have already started their post-war planning.

The second folder prepared and mailed out is called "The Public Pays for Pub-

(*Concluded on next page*)

WELLMAN WILLIAMS TYPE BUCKETS

Since 1931 Wellman Buckets have combined the many special mechanical features of the famous Williams Clamshell Bucket with the construction "know-how" of The Wellman Engineering Company. For 50 years Wellman has built heavy bulk material handling equipment for steel plants and other heavy industries.

Multiple Rope and Power Arm Types • Dragline • Power Wheel • Dredging • Special Service Buckets ⅛ to 16½ Yd. Capacities.

Welded Rolled Steel Construction

FOR GREATER STRENGTH LIGHTER WEIGHT • LONGER LIFE

Welded construction, once confined to custom-built Wellman Buckets for steel mill and dredging service, is now featured in every Wellman-Williams Bucket.

SEND FOR FREE BULLETIN

Tell us about your particular requirement and we will send full description of construction and features in special bulletins which clearly prove why YOUR NEXT BUCKET SHOULD BE A WELLMAN.

THE WELLMAN ENGINEERING COMPANY
7012 Central Avenue • Cleveland 4, Ohio
Sales and Service Agencies in principal cities

ALASKAN HIGHWAY

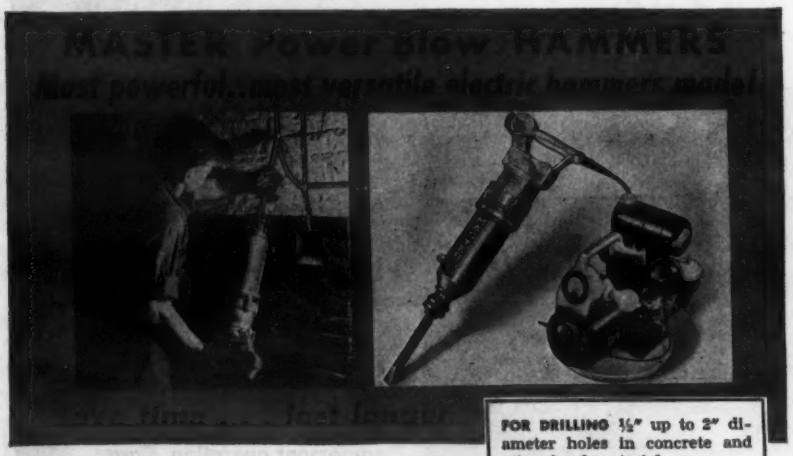
BOTH MEN AND MACHINES . . .

Built in rapid time, this vital supply route to Alaska and beyond is a fitting memorial to those who planned and completed it. Both men and machines deserve a lot of credit. Day and night service in all kinds of weather required rugged and dependable equipment . . . the kind that Galion builds.

Yes, Galion motor graders met the severe test with the U. S. Engineer Corps on this strategic job. Will continue to provide top performance on many roadbuilding programs in the post-war period.

THE GALION IRON WORKS & MFG. CO.
Main Office and Works: Galion, Ohio

GALION



Available with tools for drilling, cutting or spading. Will do light duty work or any heavy duty work. The Master Hammer runs without striking a blow until pressure is applied, enabling operator to control blow as job requires. Easy and economical to operate. Built for light weight and long service. Used throughout the world. Power blow hammers operate on 115 volt AC or DC, 25, 50, or 60 cycle. If no electricity is available use Master Portable Generator Plant Model 650 (illustrated above).

Write for Bulletin 500 for complete details.

FOR DRILLING ½" up to 2" diameter holes in concrete and other hard materials.

FOR CUTTING concrete and other materials. For vibrating, tamping, chipping steel, cast iron and wood...scaling and caulking...peening welds and other heavy work.

FOR SPADING, cutting clay and similar materials.

MASTER VIBRATOR COMPANY
Dayton 1, Ohio • Distributors throughout United States and Canada
Products include: Concrete Vibrators, Gas or Electric Surfacing Attachments, High Speed Tools, • Vibratory Concrete Finishing Screeds • Rotary Concrete Floor Finishing Machines • Portable Gas Electric Generator Plants, 500 Watt to 17000 Watt, Voltage Regulators and Portable Mountings Optional • Master Flood and Shovel Lights • Flexible Gas Engine Driven Power Blow Hammers

AGC Branch Leads In Planning Campaign

(*Continued from preceding page*)

lic Construction". This discusses the importance of the proper use of public funds, pointing out that the public gets the most for its money when public works construction includes only needed projects, built as economically as possible, and when such a program of public construction provides the maximum in jobs and public welfare.

The schedule calls for advertising in some thirty dailies four times during the first ten months of the year, the use of the state magazines regularly every month, and direct mailing pieces sent to the list of public officials and others at intervals of sixty to ninety days.

Accomplishments

One of the interesting results from the first three months of this program is the recognition already being given to contractor members of the Carolinas Branch and their appointments to local planning boards in both states. It is believed that before the year is out, the attention of public officials as well as of the man on the street will be focused on the part which the general contractor can play in post-war planning. Perhaps incidentally, but nevertheless a fact, Collier Cobb, Jr., a Past President of the Branch, has been appointed as head of the North Carolina State Planning Commission.

Another successful phase of the program is the speaking tour which was recently completed. This was made by Dr. Gus Dyer, Economic Advisor and Chief of the Speakers Bureau of the Southern States Industrial Council. His tour included some twenty-five talks in twenty-one cities in North and South Carolina before civic clubs and combined groups of that nature. The tour was given widespread publicity, and is considered a great success. Dr. Dyer is known throughout the South as a crusading advocate of the American system of free enterprise.

Another accomplishment has been the securing of active interest on the part of the membership of the Carolinas Branch itself through local committees in the principal towns or areas, where members are cooperating in many ways by personal contact and in securing local publicity. This has been good for the Association as well as the undertaking.

The Carolinas Branch

The membership of the Carolinas Branch of the Associated General Contractors comprises about 130 general contractors, and a somewhat greater number of subcontractors, supply-house representatives, insurance representatives, and equipment dealers. C. P. Street, McDevitt & Street Co., Charlotte, N.C., is President of the Branch, and Frank H. Connor is Acting Executive Secretary.

Gasoline and oil power the attack. Use yours wisely; don't waste them!

Groundwork for Air Power

BATTERIES of Tournapulls, dozers, scrapers almost overnight transform the rough terrain of invaded areas into emergency flying fields. This high-yardage dirt moving needs the rugged power of *heavy-duty* engines.

To maintain continuous, hard-hitting performance of Diesels and heavy-duty gasoline engines, contractors everywhere have found definite help through *effective* lubrication...Texaco.

Texaco Ursa Oil X★★, for example, is an additive type heavy-duty oil that is both detergent and dispersive. Its detergency keeps piston rings free and engine parts clean. Its dispersive ability holds deposit-forming materials in suspension until drained at oil change. *Ursa Oil X★★* protects alloy bearings and prevents scuffing of rings, pistons, cylinders.

For quieter-running, longer-lasting transmission and differential gears, use Texaco gear lubricants.

Texaco lubricants have proved so effective in service that they are definitely preferred in many fields, a few of which are listed at the right.

Texaco Lubrication Engineering Service is available to you through more than 2300 Texaco distributing points in the 48 States. The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THEY PREFER TEXACO

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

TEXACO

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

TUNE IN FRED ALLEN EVERY SUNDAY NIGHT—CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

This Hose Will Last Longer...

BECAUSE IT'S EQUIPPED WITH

"G J-BOSS"

GROUND JOINT

HOSE COUPLINGS

STYLE X-34

One way to insure longer life for hard-to-get rubber hose, is to give it the protection afforded by "G J-Boss" Couplings . . . designed and built to guard vulnerable hose ends from damage and possible early failure. Ground joint construction provides a *washerless*, soft-to-hard metal seal that remains leakproof, regardless of the presence of abrasive particles. Efficient "Boss" Offset Interlocking Clamp exerts a powerful, full-circumference grip on the hose that is proof against straight line leaks and blowoffs. Sizes: ½" to 4", inclusive. For high or low pressure steam, air and liquids.

★ ★ ★

"BOSS" Washer Type Couplings, Style W-16

Same efficient design and sturdy construction as above, with washer instead of ground joint union between stem and spud. Sizes: ¼" to 4", inclusive.

★ ★ ★

"BOSS" Male Couplings, Style MX-16

Companion male couplings for both the "G J-Boss" Style X-34 and "Boss" Style W-16, and made to the same specifications for strength, durability and efficiency.

★ ★ ★

Sold by Leading Manufacturers and Jobbers of Mechanical Rubber Goods.

DIXON

VALVE & COUPLING CO.

Main Office and Factory: PHILADELPHIA, PA.

BRANCHES: CHICAGO · BIRMINGHAM · LOS ANGELES · HOUSTON

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Avenue, New York 16

Enclosed is my remittance of $2 for the next twelve issues of CONTRACTORS AND ENGINEERS MONTHLY.

Name_____

Position_____
(Or Type of Business)

Address_____

(City)_____

N. B., Cash, check or postage stamps will be entirely acceptable.

The Clark three-blade hole cutter set.

Three Hole Cutters For Many Materials

A new set of three adjustable hole cutters which cut all diameters from 5/8 to 3½ inches in cast iron, brass, stainless steel, fibreboard, plastics, and in pipe, tubing, and other curved surfaces, has been announced by the Robert H. Clark Co., 9330 Santa Monica Blvd., Beverly Hills, Calif. These new additions to its line of adjustable cutting tools have straight shanks for use as hand tools, in portable electric and pneumatic drills, or in light drill presses and are said by the manufacturer to produce clean accurate holes requiring no after-grinding, reaming or filing.

The three hole cutters, with an extra set of blades for each, are packed in a handy wooden box 3½ x 7¼ x 10 inches which is securely fastened to protect shanks, pilots and blades when jostled around in a repair kit or mechanic's tool box. The cutters consist of a straight shank on a hexagon body, into which are set three high-speed steel blades at 120-degree intervals. The shanks are heat-treated and the three blades are precision-ground high-speed steel. The smallest of the three cutters has a 3/8-inch straight shank, cuts holes 5/8 to 1½-inch in diameter, and is equipped with a ¼-inch drill pilot. The second size has a ½-inch shank and cuts all diameters of holes between 1 and 2½ inches. The largest in the set has a ½-inch straight shank or No. 2 Morse taper and covers all diameters between 2 and 3½ inches. The hardened and ground pilots on the largest-sized tools are removable and may be replaced with lead drills if desired.

Clark adjustable hole-cutter blades are easy to set, requiring only a steel rule for measuring the distance from the pilot to the edge of each blade. Close tolerances may be held without difficulty, the manufacturer states. Other sizes of Clark hole cutters are available in various sizes for diameters up to 10 inches and thickness capacities up to 2 inches, but are not included in this set. Further information and complete specifications may be secured direct from the manufacturer. Just mention this item.

State Highway Debt Service Requirements

Comprehensive data on future state highway debt service requirements have recently been released by the Public Roads Administration. This study covers only highway debts for which the state is directly responsible, and excludes such quasi-state highway developments as the Golden Gate Bridge, Pennsylvania Turnpike, highway facilities of the Port of New York Authority, and other less widely known projects.

The aggregate state debt for highways on December 31, 1942, was $1,737,057,000. Of this amount, $1,723,642,000 was for roads and bridges on the state systems, and the remainder, $13,415,000, was for construction of county and local highways. Reserves for principal totaling $199,713,000, when offset against the gross debt, reduce the net debt to $1,537,344,000. Since the grand total of retirement reserves was practically unchanged during the year, the reduction in both gross and net debt was slightly in excess of $100,000,000.

The current rate of income from highway-user taxes, even in the states with relatively large highway debts, makes it seem improbable that any state will have to use other than normal sources of revenue to meet highway debt service requirements in the next few years, the Public Roads Administration states.

Travel by Car to Panama May Be Possible in 1947

Continuous passenger-car travel between the United States and the Canal Zone will be possible over the Inter-American Highway by December, 1947, when the dry season sets in, provided sufficient funds are made available, according to Edwin W. James, Chief of the Inter-American Regional Office, Public Roads Administration. This prediction was made in a press interview recently at Panama City, just after Mr. James had completed a tour of the Inter-American Highway from Tapachula, Mexico, southward to Panama by passenger car, jeep and plane.

Mr. James, in charge of the cooperative highway construction which the Public Roads Administration is undertaking with the Central American republics, under the provisions of the Inter-American Highway Act of December, 1941, said that the present impassable stretches, amounting to about 99 miles in southern Costa Rica and 25 miles in northern Panama, can be opened by the latter part of 1947, if the necessary funds are made available. Although two uncompleted gaps also remain in southern Mexico, the Mexican government is pushing construction on these sections and it is assumed that they will be ready for travel by the time the rest of the route is finished.

MONDIE DROP and UPSET FORGINGS

FOR CONSTRUCTION EQUIPMENT

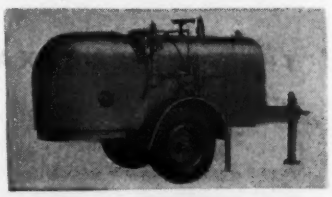
Such as Dipper Teeth, Trencher Teeth, Gear Blanks, Levers, Tie Rods, Cranks, Crank Shafts, Special Shapes, etc. Forging weight range from 1 to 50 pounds.

Inquiries given prompt attention by our Engineering Dept.

MONDIE FORGE COMPANY INC.

10299 Berea Road — Cleveland 2, Ohio

Exhibit A...OF A VITAL POSTWAR JOB, EVERY COUNTY, U. S. A.



Cleaver-Brooks Portable Tank Car Heater—a high pressure, oil-fired, compact mobile heater, available in two and three tank car sizes.

Truck-mounted Cleaver-Brooks Portable Pumping Booster used in airport, flight strip, and road construction.

THE above picture could be that of any one of scores of American highways. Temporary patching and spot repairs may serve for the duration, but War's end will call for a nation-wide program of existing road reconstruction plus new highway projects.

Be ready—be competitively equipped—to get your full share of the work.

Time and cost-saving machines will enable you to handle more jobs with more profit . . . Write today for complete information on Cleaver-Brooks Tank Car Heaters and Bituminous Boosters. Get the complete facts on their high speed low cost performance—heating road oils and bituminous materials to application temperatures. Learn why the original and exclusive Cleaver-Brooks four pass down-draft flue travel and integral burner construction, plus the positive dry-coil method of condensate return, provides unsurpassed speed and economy. Cleaver-Brooks Tank Car Heaters are built in two and three tank car sizes—Portable Pumping Boosters in two capacity sizes, with truck mounting or 4-wheel trailer. Send for bulletins or see your Cleaver-Brooks distributor.

CLEAVER-BROOKS COMPANY, 5110 N. 33rd Street, Milwaukee 9, Wis.

Cleaver-Brooks

TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM PLANTS

The Highway Needs Of State of Texas

Report at Hearings Shows Present System Inadequate; Large Volume of Work Is Required in Post-War Era

✦ DURING the hearings on Bill H. R. 2426 before the House Roads Committee, the Texas delegation presented a statement showing something of the future possibilities of development in the Lone Star State, and the resultant need for highway construction; indicating that the present improved highway system is preponderantly inadequate; urging Federal appropriations from the gasoline tax to aid the states with their essential highway needs; and pledging that the state is ready to cooperate to the end that, if appropriations are made, such funds can and will be economically expended in Texas for permanent highway improvements in keeping with the full purpose of the proposed legislation.

The statement pointed out the broad proportions of the state of Texas, both in area and economics. It is farther between the eastern and western cities of Texarkana and El Paso than it is from Chicago to New York, and farther from Texline on the north to Brownsville on the south than from Washington to St. Louis. Economically, the area represents extensive agricultural development, which must be served by adequate highways, as well as numerous scattered oil fields. Some of the oil development is quite old, while new fields are being brought in regularly, often requiring new or expanded highway facilities.

Present Status of Highways

At the present time there are 196,989 miles of roads being used by the traveling public in Texas. Of this total, 26,989 miles are on the state and Federal highway system and 170,000 miles are county roads. There are 17,226 miles of Federal-Aid highways, 8,627 miles of state highways, and 1,156 miles of farm highways, ranch highways and park roads, all under the jurisdiction and responsibility of the Texas Highway Department.

During the past year, a careful inventory has been made of the road needs in Texas. These studies revealed that, if funds were available, a total sum of $768,229,777 could logically and properly be spent on the road system in Texas in the immediate post-war period. Although this is rather a staggering sum, this actually represents the road needs of the state at the present time. Under the provisions of H. R. 2426 as proposed, Texas would have an annual program of approximately $84,000,000. For the three-year program, the total would be $252,000,000. It can thus be readily seen that, although the provisions of the bill would make possible great strides in the accomplishment of the Texas Highway Department's objectives, it would not satisfy the complete road needs of the state.

The presently indicated Interregional Highway System in Texas would total 2,725 miles, of which 2,465 miles are in rural areas and 260 miles in cities of 10,000 or more population. Not one mile of the present Interregional System in Texas is constructed to the proper standards of design. Not over one-half of the mileage is constructed to a standard which could be considered reasonably adequate until proper construction can be provided. The Department's inventory revealed that the cost of the rural portion of this system would be $244,500,000 and the urban portion would cost $67,000,000, or a total of $311,500,000 for the Interregional Highway System in Texas.

The regular Federal-Aid System in the state constitutes the network of roads which is the backbone of the transportation system. Due to the present necessary restrictions on highway construction, it has been seriously neglected during the war period. The need for its reconstruction and modernization becomes more apparent each day. An analysis reveals that to bring this system up to the proper standard of design to accommodate its traffic would cost $208,706,777.

The Federal-Aid secondary system and the state highway system are in general the same and form the connecting links between the main Federal arteries, serving traffic local in nature and yet connected in a fashion to provide proper interchange of traffic throughout the entire system. To provide for the actual needs of this system would cost $88,023,000.

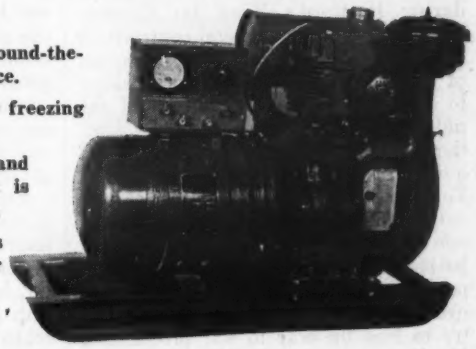
The last, but certainly not the least, group of roads in need of improvement in Texas is the farm or ranch-to-market road system. For several years the State Highway Commission has been receiving many requests for the improvement and maintenance of local service roads that are now in the county system. A study made of the county road system throughout the state showed that there are many

(*Concluded on page* 83)

WINPOWER —MODEL WP2A— ELECTRIC PLANT with Wisconsin AEH air-cooled engine

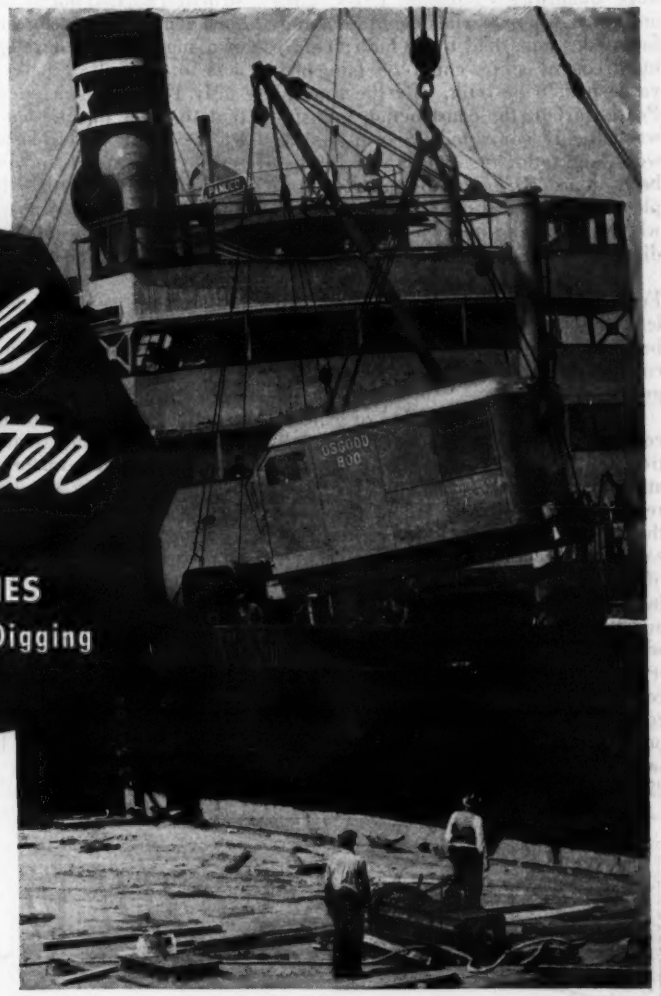
—Advantages—

- Sturdily built: capable of round-the-clock, day-in-and-day-out service.
- No boiling over in summer nor freezing in winter (air-cooled engine).
- Portable—Mounted on skids and weighing only 300 pounds, it is readily moved from job to job.
- Has sufficient weight for use as a stationary unit without danger of its "walking around."



2000-watt, 110-volt, 60-cycle, 1800 rpm; uses AC current.

Send for Complete Catalog and Prices. WIND POWER MFG. CO., Newton, Iowa



Dependable Globe-Trotter

OSGOOD SHOVELS and CRANES Go Where the Fighting and Digging are TOUGHEST

Headed for the fighting front is another 48 tons of cargo that will "dig down" and pay its own passage anywhere and at any time.

In Italy, on New Guinea and Guadalcanal, from Alaska to South America . . . in every part of the globe where our combat forces need roads and construction, Osgood Shovels and Cranes are helping to clear the way to Victory around the world.

Rugged, dependable, easy to handle and maneuver because of Osgood measured air control, these shovels, pile drivers, drag lines and cranes are doing outstanding work in *all* kinds of going . . . from rubble to rock.

Soon, thanks in part to their performance in this country and abroad, Osgoods again will be available to the construction field. Until that day, keep your dependable Osgood in action with preventive maintenance!

Buy Another War Bond Today!

THE GENERAL EXCAVATOR COMPANY CRANES, DRAGLINES AND SHOVELS DIESEL, GAS, ELECTRIC

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OSGOOD SHOVELS, DRAGLINES CRANES CRAWLER & WHEEL MOUNTS DIESEL, OIL, GAS, ELECTRIC

General Contractors Have Big Opportunity In Post-War Period

The general contractor's place in the post-war picture was discussed by H. E. Foreman, Managing Director, Associated General Contractors of America, in a recent speech in Hartford, Conn., during Hartford's Week for Connecticut's Future. "The general contractor's central responsibility for the execution of construction puts him in a position to influence business conditions of the industry. He has the opportunity after the war to help bring about the kind of a nation for which we are fighting," Mr. Foreman said.

Construction is being looked upon as one of the first, if not *the* first, large and basic industries to lead the way back to peacetime conditions when the war is over, just as it was the first great industry to lead the way to war production, Mr. Foreman pointed out. Before men in the armed services could be trained, facilities had to be built for them; before huge quantities of planes, tanks, guns and other war materials could be manufactured, plants had to be built; before hundreds of ships could be launched, yards had to be built. By the time of Pearl Harbor, the construction industry was already converted 75 cent to war work, and today most of its war job has been done. It has substantially completed on or ahead of schedule a task in which delay or failure could have meant disaster.

Just as it led the way into the war, Mr. Foreman said, so construction now can lead the way into the post-war future, because it will not have most of the reconversion problems faced by other great industries.

Because of the key position of general contractors in the execution of construction, they have a great responsibility and at the same time a great opportunity to render the nation a service by throwing the full weight of their individual and collective strength into the improvement of conditions within the construction industry which will provide more jobs and greater opportunities for individuals who want to work in or enter the industry. To provide a means for general contractors to strive for these objectives collectively was one of the fundamental purposes for the organization of the Associated General Contractors of America 25 years ago, Mr. Foreman stated.

Six AGC principles were outlined by Mr. Foreman. The first is the principle that the leading part of the development of the nation after the war shall be undertaken by private enterprise. The second is that the construction industry should cooperate with other industries, labor and agriculture, as construction, while an important and basic industry, is only a part of the national economy and both influences and is influenced by the many factors making up our total economy. The third principle is that general contractors should promote the construction of only those projects which are undertaken primarily because of a real need for the particular physical improvement or for their cultural value.

Fourth in this list of AGC principles is that the industry should continue to improve its efficiency so that the investor in construction will receive greater value for his construction investment. The fifth is that construction should be executed through the normal channels of the construction industry, with the plans and specifications prepared by qualified architects and engineers and the construction carried out by contract. Lastly, each general contractor must exercise his own ingenuity in developing new business for himself.

Mr. Foreman concluded: "The important thing at the present time is not to let the many problems, no matter how serious, obscure an understanding of two fundamental facts, that the construction industry will be looked upon to provide a large volume of employment after the war, and that what this nation has been fighting for is a way of life based upon the right of each individual to have an opportunity to work for his advancement according to his ability and initiative.

"Because of the key position of general contractors in the execution of construction, they have both the great responsibility and the great opportunity to perform a service to the nation and its citizens by taking the lead to improve business conditions in the construction industry so that there is free and open competition, and all individuals in it have an opportunity to work toward building a greater nation."

New Folding Ladder Described in Circular

A folding ladder of light-weight material, suitable for use in highway shops and parts departments, is described in a circular available from the Duo-Safety Ladder Corp., Oshkosh, Wis. This new type G ladder folds together compactly when not in use, and can be quickly adjusted to working position, it is reported. It is equipped with a special locking device which is said to keep it absolutely rigid in the open position, and with Duo-Safety Shoes to provide maximum safety on all types of surfaces. Ten sizes are available, from 6 feet to 20 feet, weighing from 15 pounds to 48 pounds, including shoes.

Copies of the folder may be obtained by writing direct to the manufacturer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

THOMPSON
POWER SPRAY MACHINE
Series 300—For Use in Curing Concrete Roads

PRICE COMPLETE
$395.00
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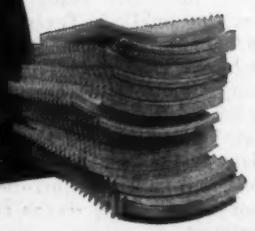
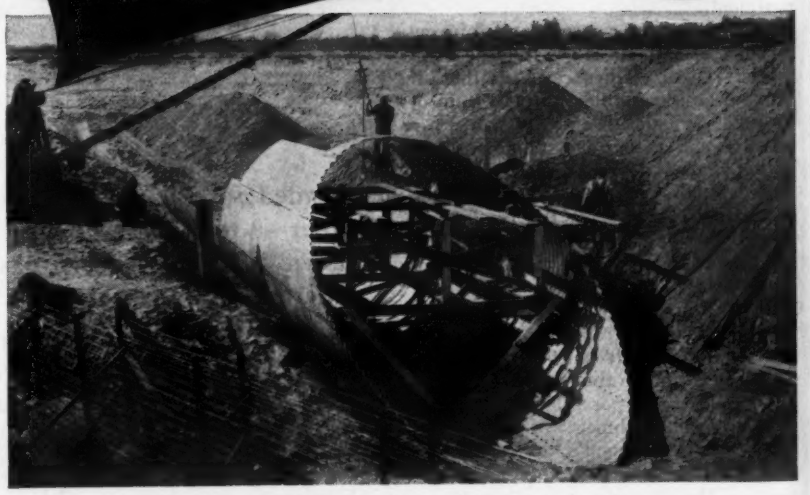
Why "PACKAGED" Bridges and Sewers are Popular with Contractors

This stack of plates built nearly 200 feet of 120-in. diameter pipe.





Erecting a "packaged" culvert, 165 inches in diameter.

Just as shipbuilding methods have been revolutionized by prefabrication and other time-saving methods, so will post-war construction be simplified and speeded by product manufacturers and contractors. One of these practical ideas is the "packaging" of small bridges and large sewers.

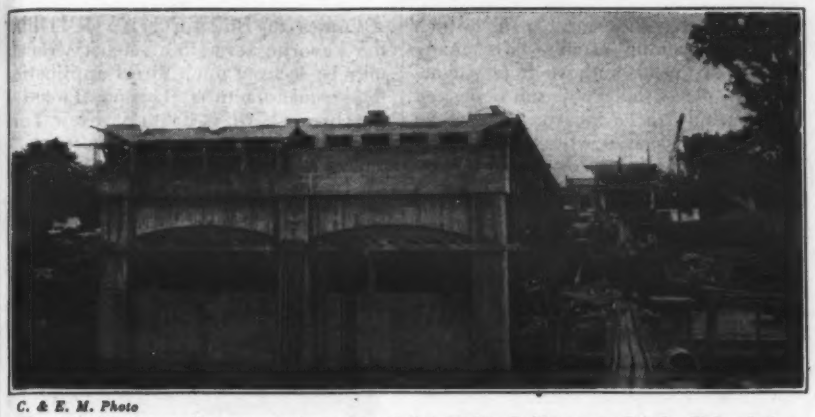
Almost as simple as changing a tire on an automobile is the assembling and bolting of ARMCO Multi Plate. The easily-handled, pre-curved corrugated plates are nested together for saving space in shipping, hauling and storing. Construction is done with unskilled labor and the simplest equipment.

The "form" is the finished structure. No curing, no waste, no delay. Other operations are speeded up too.

ARMCO pioneered and developed this "packaged" product. Before the time comes to bid and build these structures, get complete information from Armco Drainage Products Association, 385 Curtis Street, Middletown, Ohio.

MULTI ARMCO PLATE

Armco Multi Plate



C. & E. M. Photo
Pier No. 27, the northernmost river pier of the Darien Bridge, completed. This photograph was taken from the industrial railway concreting trestle. The concrete plant is seen in the right background.

Darien Bridge

(*Continued from page* 13)

edge for longitudinal screeding. Two pairs of plow handles at each end permitted four men to pull or push at each end simultaneously. All concrete in columns, girders and decks was vibrated as it was placed by Master vibrators powered with Briggs & Stratton gasoline engines.

The Column Forms

The river column forms were built in the contractor's fabricating yard on the north bank of the stream just west of the structure. The yard had two CMC saw tables and one Rex, all with gas-engine drive. There was an average of fifteen carpenters on the job at all times. The forms for the river columns were used over three times and were handled by the Northwest crane on a barge as well as by the steam crane when necessary. They were stored on an extra barge when not in use so as to be ready for use promptly without rehandling.

These forms consisted of 2 x 6-inch tongue-and-groove lumber running vertically with 2 x 6-inch battens and 4 x 6-inch wales. At the corners where the battens crossed, 4 x 6-inch locking wales were tied in with heavy rods and Richmond Tyscrus. Through the body of the column ⅝-inch round rods were run, through paper tubes to permit easy removal when the forms were stripped, to tie the wales.

Deck and Girder Forms

A simple system of falsework was used to support the concrete-deck and girder forms for the approach spans. Stub piles were driven into the marsh with 30-foot penetration and cut off 2 feet above the marsh. There were twelve piles per bent capped with 10 x 12-inch timber and on these were laid 6 x 10-inch stringers on which the dragline or crane was run to drive the next bent. It also carried the stringers ahead and placed the falsework of local pine posts on the caps. The falsework posts were capped with 8 x 10-inch timber carrying 5 x 10-inch stringers for the bottom forms, with two under each of the five concrete girders in each span. This made ten stringers, with one extra on the outside on either side of the bridge for the sidewalk forms.

The beam forms supported by the falsework described above consisted of 2 x 6-inch form lumber for the bottom and 1 x 6-inch on the girder sides and deck forms with 2 x 6-inch studs on 15-inch centers for both the girders and the decks.

A pair of Northwest ¾-yard cranes were used for all the work on the land bents on the south approaches, erecting the falsework and handling the forms and concrete.

On the north approach spans a Novo pump and engine were set on the falsework to deliver brackish water from the river to the deck for washing the forms and for curing.

The South Approach Fill

The approach fill at the south end of the bridge was placed partly by dredge and partly by trucks. A 16-inch hydraulic dredge of the Spaderro Contracting Co. of Sarasota, Fla., delivered 62,000 cubic yards of coarse sand fill in place. In addition 11,000 cubic yards of a sandy loam was hauled in by truck and road-mixed with the coarse sand for the roadway surfacing. This is similar to the work done on the approaches to the South Altamaha River Bridge (see C. & E. M., January, 1944, pg. 52).

Major Quantities

The major quantities in the bridge and approach-fill contracts were as follows:

Contract 1, Substructure	
Class A concrete, substructure	3,350 cu. yds.
Class A concrete, deposited in water	4,000 cu. yds.
Bar reinforcing steel	350,000 lbs.
Bridge timber, fenders	10.5 MBM
Timber piling, untreated	57,000 lin. ft.
Timber piling, treated 16-pound	4,600 lin. ft.
Precast concrete piling, abutment	1,500 lin. ft.
Excavation, No. 1, structural	10,100 cu. yds.
Excavation, No. 2, below footings	1,200 cu. yds.
Excavation, channel	10,000 cu. yds.
Riprap	1,000 sq. yds.
Clearing and grubbing	6.669 acres
Contract 2, Steel Superstructure (Except Floor)	
Structural steel	1,180,000 lbs.
Contract 3, Concrete Deck and Girders	
Class A concrete, superstructure, 40-foot spans	2,775 cu. yds.
Bar reinforcing steel	698,000 lbs.
Concrete hand-rail	2,905 lin. ft.
Class A concrete, deck on steel superstructure	575 cu. yds.

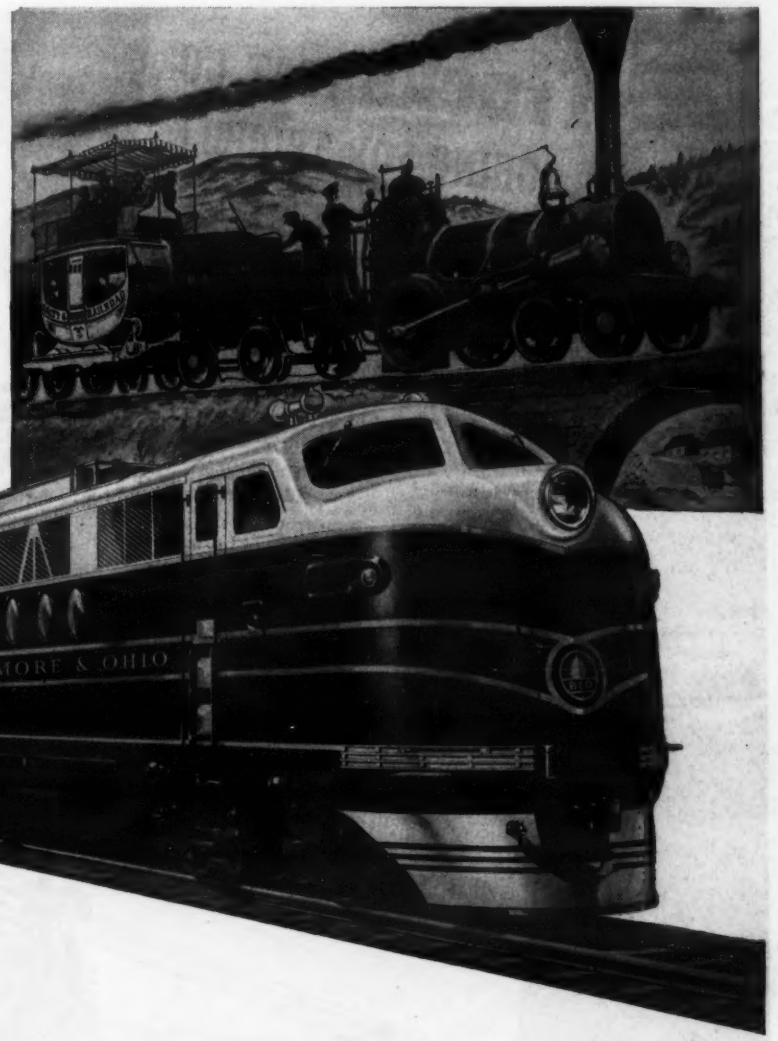
Personnel

The contracts for the construction of the Darien Bridge were awarded by the State Highway Board of Georgia and totaled more than $1,000,000. Contracts 1 and 3 were awarded to Scott Construction Co. of Thomasville, Ga., for which E. J. Black was Superintendent on substructure operations and Roy Philips, Superintendent on superstructure and deck concreting. The Nashville Bridge Co. of Nashville, Tenn., received the contract for the steel superstructure. For the State Highway Board the bridge was designed by C. N. Crocker, Bridge Engineer, and was built under the supervision of D. D. Hankins, Division Engineer, with E. W. Ellis, Senior Bridge Engineer, as Resident Engineer in charge.

Construction of an express parkway between Washington, D. C., and Baltimore, Md., has been approved by the Maryland-National Capital Park and Planning Commission. Traffic on the parkway would be limited to passenger vehicles.

The LaFayette—1837. One of the earliest B & O locomotives to haul the trains of the Presidents of the United States.

PREFACE OF A NEW ERA



GM Diesels have the exacting job of hauling B&O's highest-class freight, including trains of perishables and other foodstuffs for the armed forces as well as for civilian markets.

KEEP AMERICA STRONG BUY WAR BONDS

DAY in and day out, General Motors Diesel Locomotives are proving their ability to haul huge loads far, fast, with little attention and at low cost. In any vision of the future of transportation, these tireless giants must loom large. Already they have won a place of rare importance by their unprecedented performance in the work of the railroads at war.

GM GENERAL MOTORS DIESEL POWER

LOCOMOTIVES . . . . . ELECTRO-MOTIVE DIVISION, La Grange, Ill.

ENGINES . . 150 to 2000 H.P. . . CLEVELAND DIESEL ENGINE DIVISION, Cleveland, Ohio

ENGINES . . . . 15 to 250 H.P. . . . . DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.

Lack of Water Also Spoils Road Ditches

While most highway departments are worried by ditch erosion caused by excessive run-off, and much thought is expended on the design and construction of satisfactory and economical means for its eradication, in certain parts of several western states a very different problem affecting ditch and shoulder maintenance presents itself.

While on inspection trips through these semi-arid areas, our Field Editor observed that the heavy winds, blowing for extended periods of time and carrying much dust, are almost as destructive as flash run-off. The damage to the shoulders of surfaced roads occurs in two ways. If the shoulder is unprotected by vegetation, the dirt of which it is composed joins the other air-borne soil, loss of which has spoiled many heretofore productive farms in the "dust-bowl" areas, and after prolonged periods of wind and drought the shoulder may become completely non-existent, thus leaving the edges of the surfacing unprotected and subject to damage from edge loads.

Where a stand of weeds or sod does grow along the shoulders, the root-system stabilizes them and there is little loss of material through wind action. However, these very weeds, whose root-system protects the shoulder, may have an action similar to that of a snow fence, causing deposit of air-borne dirt either on the surfaced roadway or in the ditches, depending on wind direction. Right-of-way fences may induce similar action, and it is not unusual to find ditches entirely filled by drifted soil or a windrow of it deposited on the edge of the surfaced way, thus creating a traffic hazard or an impediment to drainage.

Soil drifts, unlike snow, will not melt and run away with the return of warm weather. Heavy blading operations may control them for a time but if the dirt is bladed to the right-of-way and left there it forms a "dust fence" and aggravates further deposits in the ditches.

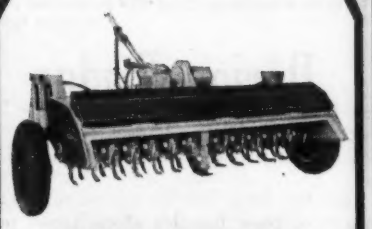
Fortunately, the same areas which have this trouble usually have many miles of dirt roads and, where no surfacing is in place, the excess soil deposited by the wind can be incorporated in the embankment forming the roadbed by heavy motor graders or tractor-pulled blades. Where surfacing prevents using this expedient, the wind-deposited soil has to be removed from the right-of-way at intervals by scrapers or trucks after being loaded by elevating graders or small power shovels.

New Ratchet Wrench

A new reversible ratchet wrench, known as the Favorite, constructed with a double head which accommodates two sizes of nuts, is described and illustrated in a new bulletin now available. The bulletin shows how the wrench is designed and operated, tabulates its principal applications, and also includes complete data on dimensions of the sizes which cover nuts for all standard square and hex bolts and studs up to 1¼ inch.

Copies of Bulletin F-10, describing the Favorite reversible ratchet wrench, may be secured upon direct application to the manufacturer, Greene, Tweed & Co., Bronx Blvd. at 238th St., New York 66, N. Y., and mention of this item.

for MIXED-IN-PLACE CONSTRUCTION



ARIENS AGGMIXER

The swirling chopping action of the tines does a thorough job of pulverizing and mixing—wet or dry—made in 4 sizes, with normal cutting width 4', 5', 6' and 7'.

ARIENS Aggmixer operates in connection with other general purpose road equipment. It does the job thoroughly, rapidly and economically with whatever aggregates and binder are used, such as all types of bitumens, cements, clays, chlorides, etc. Easy and safe to operate . . . adjustable to any tractor . . . hydraulic adjustment for depth is simple and positive. Complete information upon request.

ORDNANCE UNITED STATES ARMY

ARIENS COMPANY
BRILLION, WISCONSIN

Trucks THAT GO LOOKING FOR TROUBLE

From the Ward LaFrance Truck Division factories in Elmira rolls a steady stream of highly specialized motor trucks for ordnance service all around the world. They are produced for the Rochester Ordnance District, Army Ordnance Department, and are the Heavy Wreckers . . . with the power, the equipment, and the traction needed to get other vehicles out of trouble. That's their main job . . . hauling disabled tanks cross-country away from the thick of battle, pulling loaded trucks out of jungle muck, fishing half-tracks out of swollen rivers. As a sideline, they unload barges, pull stumps, and trundle crashed bombers off to repair shops.

These big, able, tough trucks are upholding a quarter of a century's reputation. After the war, the stamina and dependability of Ward LaFrance trucks will be available . . . particularly to fleet owners. If you operate a fleet, you should find out how you can secure the advantage of trucks specifically engineered to their jobs . . . on a basis which will add economy and efficiency to your operation. Competent engineering counsel is available right now.

WARD LaFRANCE
TRUCK DIVISION
GREAT AMERICAN INDUSTRIES, INC.
Elmira New York

Back the ATTACK!
Buy War Bonds

Borrowed Valves Installed at Friant

(*Continued from page 37*)

essary to commence the work behind cofferdams which were formed of 12 x 12-inch timbers inserted in grooves in the trash-rack structures, which extend in a semi-circle upstream from the openings. The timbers were caulked, and pieces of waterproofed canvas 12 x 20 feet in size were placed outside the timber bulkheads which helped to reduce infiltration. Bulkheads were set 32 feet high above the impervious bottom of the trash-rack structure, and a number of pumps were used for initial unwatering, including three deep-well pumps, two 40-hp Byron-Jackson pumps with 6 and one with 10-inch discharge, and one 12-inch centrifugal. After unwatering had been completed, the infiltration was easily handled by a single pump.

At Elev. 380, four 110-inch river outlets extend through the dam, sloping down to Elev. 330 at the outlet ends, and it was necessary to place gate frames and guides for all four to an elevation well above the rising waters of the reservoir before work was continued on the other openings, two of 91-inch diameter at Elev. 446 for the Madera Canal and four more 110-inch openings at Elev. 464 for the Friant-Kern Canal.

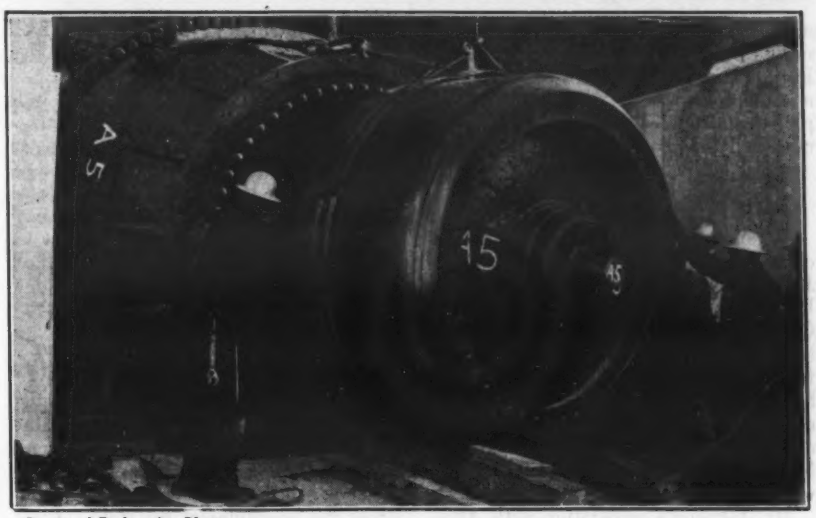
The heavy prefabricated sections of the gate frames and guides were shipped by rail to Friant, unloaded in a storage yard near the toe of the dam, cleaned by sand blasting, and given a protective asphaltic coating. Hauled to the top of the dam by trucks, they were lowered into position by an Osgood gasoline-powered crane. Workmen on platforms erected in the concrete trash-rack structure lined up and secured them in the slots which were later filled with concrete mixed and lowered from the top of the dam. Several Oxweld torches and a Hobart arc welder were used in this work. Three Ingersoll-Rand and two Sullivan air drills were used for chipping and dressing the concrete, while an Ingersoll-Rand impact wrench was used in cleaning the threads of the anchor bolts. Air for the pneumatic tools was piped to the site from the central compressor house located near the unloading yard where a Sullivan 563-cfm and a Gardner-Denver 870-cfm compressor furnished pressure for their use as well as the sand-blasting operations.

A Reo Speedwagon with a low flat bed, rigged with a fixed horizontal boom, was used for miscellaneous hoisting operations to relieve the Osgood crane. This outfit consisted of a single-drum hoist driven through a power take-off and handling a line through sheaves on the 12 x 12-inch horizontal timber boom chained to the top of a 10-foot tower built of 3 and 4-inch pipe on the truck floor.

After operations had proceeded to a point above the tops of the trash-rack structures, all work was done from sturdily built four-deck sectional scaffolds suspended by cables from the top of the dam and raised when necessary by the crane on top of the dam. A stable and safely railed stairway suspended by cables from the top of the dam afforded access to the working platforms.

Installation of Needle Valves

When the outlet pipes were unwatered and the installation of the upstream gate frames and guides had proceeded sufficiently to permit the placing of the upstream gates, two of the 84-inch needle valves, shipped by rail from Boulder Dam and trucked in sections from the unloading yard to the point of installation, were placed on the downstream ends of two of the river outlets, being attached by a specially designed connection reducing the 110-inch-diameter tube to the 84-inch diameter of the needle valve. A temporary traveling gantry crane was used for placing the heavy sections. Tapered steel discharge cones attached to the downstream end of the other two river outlets were closed with concrete plugs, and the Friant-Kern Canal outlets and one of the two Madera Canal outlets were closed with temporary steel bulkheads. These plugs can easily be removed and replaced by needle valves of proper size when they became available. The third needle valve borrowed from Boulder Dam was installed on one of the 91-inch outlets for the Madera Canal through a less elaborate reducing fitting.

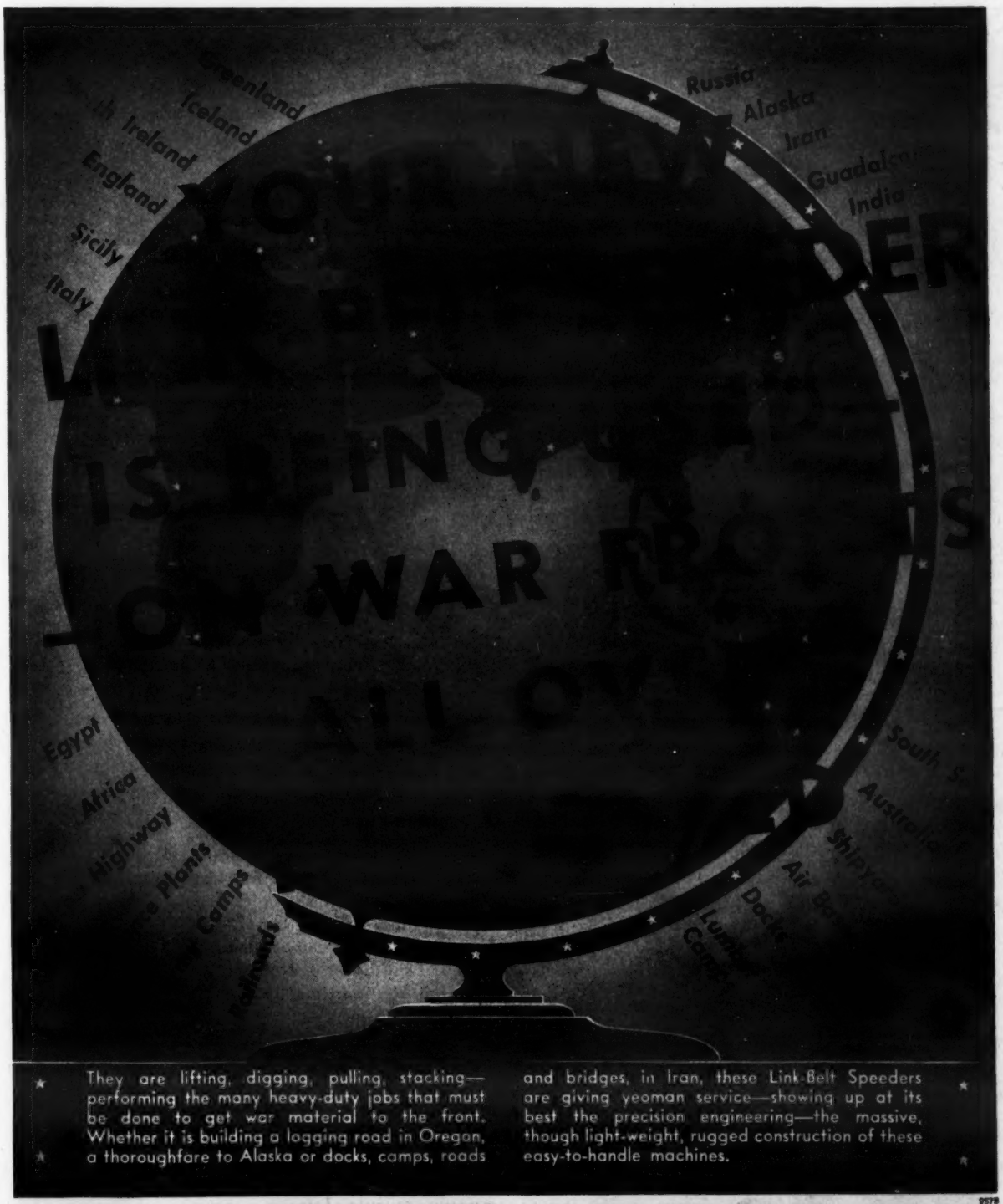


Bureau of Reclamation Photo

Installing a section of 84-inch needle valve at Friant Dam.

Personnel

Because of the uncertain elements involved in work of this kind, it was not considered practicable to award a lump-sum or unit-price contract for this operation, so a negotiated fixed-fee contract was awarded to the Utah Construction Co., on September 24, 1943. E. L. Causey was Project Manager for the contractor and J. P. Jones, Engineer of the Bureau of Reclamation, was in charge of the work, under the direction of R. B. Williams, Construction Engineer, Friant Division, Bureau of Reclamation.



They are lifting, digging, pulling, stacking—performing the many heavy-duty jobs that must be done to get war material to the front. Whether it is building a logging road in Oregon, a thoroughfare to Alaska or docks, camps, roads and bridges, in Iran, these Link-Belt Speeders are giving yeoman service—showing up at its best the precision engineering—the massive, though light-weight, rugged construction of these easy-to-handle machines.

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LINK-BELT SPEEDER

Builders of the Most Complete Line of
SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO 9, ILL.
A DIVISION OF LINK-BELT COMPANY

Minn. Acquires R/W Now for Future Use

(*Continued from page* 51)

involved, and the issue is finally settled through established court proceedings.

Final Payment

After the assessment of damages has been made, final payment is promptly forthcoming from the state funds previously earmarked for the purpose. All Minnesota expenditures are pre-audited and funds set aside for a specific use so that they are always available for immediate payment of an obligation, and right-of-way claims are no exception. This prompt payment in cash does much to insure a spirit of cooperation on the part of the claimants and has materially reduced right-of-way costs.

Right-of-way purchases for post-war construction are conducted on a schedule as rigidly established as though the contract for the work involved were to be let immediately. Completion of right-of-way acquisition has kept pace with the design schedule for post-war work and, in addition, all rights-of-way have been secured for projects which were scheduled for award at the time that the war curtailed new construction in the state.

Three New A-C Officials

Announcement has been made of the election of W. A. Roberts, William C. Johnson and James M. White as Vice Presidents of the Allis-Chalmers Mfg. Co., Milwaukee, Wis. Mr. Roberts has been connected with the Tractor Division for twenty years and is credited with having contributed greatly to its development. He became General Sales Manager in 1931 and in 1941 was named Manager of the Tractor Division, a title which he will retain as Vice President.

Mr. Johnson's association with Allis-Chalmers dates from 1924. After starting as a field engineer, he entered the Sales Department in 1929 and served in various branch offices until his appointment as General Sales Manager of the General Machinery Department in 1942. He will continue in charge of all sales with the exception of tractors.

Mr. White has been with Allis-Chalmers since 1929, starting in the manufacturing department. He has served as Acting Works Manager at the La Crosse plant, Works Manager at the La Porte plant, and since 1942 has been General Works Manager. As Vice President he will direct manufacturing activities of all Allis-Chalmers plants.

Indiana Seeks to Halt Vandalism on Highways

The citizens of Indiana are being called upon to cooperate in fighting the vandalism on state highways which is a threat to the State Highway Commission's carefully planned program to improve the roadsides of the state. Trees have been chopped down just as they were beginning to present the landscape effect for which they were planted, and numerous complaints have been received, particularly from residents in rural areas, that during the night trash has been dumped almost in their yards.

In an effort to protect the attractive appearance of Indiana roads, now and in the future, every citizen has been asked to report immediately any person observed cutting trees or dumping trash along the highway.

THEY'RE IN THERE
PUNCHING

Hour after hour, Barco Portable Gasoline Hammers stand up to gruelling punishment...keep driving the work forward. No matter how tough the conditions... breaking, drilling, driving, tamping or digging...a Barco has the adaptability of design and sturdiness of construction to lick the job. Eleven special tool attachments available to meet varying needs. Write for further information. Address: The Barco Manufacturing Company, Not Inc., 1818 Winnemac Avenue, Chicago 40, Illinois.

BARCO PORTABLE GASOLINE HAMMERS

BARCO MANUFACTURING COMPANY, NOT INC.
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In Canada: The Holden Co., Ltd., Montreal

Saves Time, Handling Equipment, and Truck Mixer Miles

• Eliminates the expense and time waste of long hauls. Easily towed to the most advantageous point in the pouring area, and quickly set up for fast, efficient operation. Meets all state highway requirements as to weight and over-all dimensions. Levers grouped in one central location making it practical for one man to control all batching operations.

Johnson patented charging skip provides pre-mixing and pre-shrinkage which compares favorably with the best results obtainable in modern permanent batching plants. This charging skip has a capacity of 33 cubic feet for aggregate and 10 cubic feet for cement. Batching cycle is 90 seconds. Gumming and excessive wear is eliminated because of effective intermingling of aggregate and cement by Johnson charger skip before the batch comes in contact with wet mixer opening and walls. Write for full details.

READY MIX PLANT
BULK CEMENT HANDLING EQUIPMENT
CEMENT STORAGE BINS
CONCRETE BUCKETS
BATCHERS

the C. S. JOHNSON COMPANY
CHAMPAIGN • ILLINOIS

Care of Equipment By Forest Service

(*Continued from page 24*)

Tire does not rub drag link on extreme left turn	2
Battery tight in case and water level above plates	6
Door, windshield and cab glass in good condition	1
Seat cushions and seat back in good condition	1
Adequate clutch pedal free play (at least ¾-inch)	1
Horn operates properly	4
Rear-view mirror is in good condition and tight	3
Signal arm (trucks) operates properly	1
Windshield wipers tight and operating properly	3
Generator operating (check by ammeter)	1
Fuel, oil-pressure and temperature gages operating	1
Vehicle equipped with following: 467-A Book	
Accident Report Forms	
Canteen	
Shovel and Axe	
Extra Fuses	2
Hand brake effective (both stopping and holding)	4
Footbrakes fully effective and evenly adjusted	7
Governor (when required) is sealed and maintains proper vehicle speed	2
Unit handles properly (driving test)	2
Vehicle is clean and neat inside and out	5

*The ratings are used by surveyors of automotive equipment. Deficiencies or evidence of neglect are noted in a blank column on Sheet "A" in accordance with the rating values indicated. The total of this column shows the extent of failure to comply with maintenance requirements.

Preventive Maintenance Sheet A, Form 107-R-5, for tractors and motor graders, lists twenty-eight similar items for checking.

Equipment condition surveys are made in the field at any time and without previous arrangement, and the operator rated in accordance with the system of demerits set out on the form. A piece of equipment on which all items are satisfactory entitles the operator to a rating of zero while demerits are assessed numerically for evidences of neglect.

Numerous plans have been tried for reminding the operator of the importance of "B" and "C" service, but the most satisfactory has proved to be the installation of a simple card in a holder in the driver's compartment, on which is printed:

PLEASE DO

Return to Depot or Branch Shop for Preventive Maintenance Service at speedometer reading ..... Miles

A "B" service is performed on all automotive equipment each 2,500 miles of operation by field, branch-shop, or equipment-depot mechanics. This service includes the inspection and adjustment of the entire unit and is intended as a maintenance operation rather than a repair. The "B" service on tractors is performed by the operator at the end of each 160 hours of operation and covers thirty-four items on the engine and tractor, five items each on the power control and trailbuilder units, and three general items on the condition of tools and grease guns. On motor graders, there are twenty-three items on the engine and drive unit, nine on the grader unit, and three general items.

"C" maintenance operations are performed and reported in a similar manner for all trucks of 1-ton or greater capacity at intervals of 5,000 miles and at 7,500-mile intervals on pick-ups and passenger cars. They include checking and adjustment of eighty-three items and performing repairs as required. On tractors and motor graders, this is performed by mechanics from the branch shop or main Depot at the end of each 160 hours of operation and covers thirty-nine items.

All forms for maintenance services are prepared in duplicate, one copy being retained by the field mechanic or branch shop and the other forwarded to the main Depot for insertion in the master equipment folder which is maintained for each vehicle in the fleet.

By keeping additional units available for use during repair periods, and requiring that repairs be performed promptly when the need arises, the Forest Service maintains a high percentage of equipment in continuous operation.

Rental Rates

Careful record keeping determines the actual cost of all equipment repairs, broken down to cover specific items, and semi-annually the costs are reviewed for adjustment of rental rates if necessary. No operating profit is allowed in the Equipment Service, and each type of equipment carries its just share of the total expense. If a definite lowering of repair expense is shown, the rental rates on that type of equipment are lowered accordingly.

Two types of rental rates are used: a "Use Rate" covering the cost of maintenance and replacement but not fuel, lubricants, or servicing, and the "Full Rate" which includes all operating costs, except salaries of operators and storage on other than Government premises.

A few typical rates in use during the last half of 1943 are given in the accompanying table.

Some Rental Rates Used by Region 5, U. S. Forest Service

Item	Use Rate	Full Rate
Light sedans or coupés	$ 0.03 per mile	$ 0.045 per mile
Trucks, dump, 2-yard	0.13 per mile	0.18 per mile
Trucks, pick-up	0.035 per mile	0.05 per mile
Wheel tractors, 10-20 hp, gasoline or diesel	0.24 per hour	0.49 per hour
Wheel tractors, 22-40 hp, gasoline or diesel	0.36 per hour	0.71 per hour
Crawler tractors, 15-30 hp, gasoline or diesel	0.95 per hour	1.30 per hour
Crawler tractors, 31-40 hp, gasoline or diesel	1.50 per hour	1.90 per hour
Crawler tractors, 41-55 hp, gasoline or diesel	1.70 per hour	2.25 per hour
Crawler tractors, 56-75 hp, gasoline or diesel	2.45 per hour	3.10 per hour
Crawler tractors, 81-120 hp, gasoline or diesel	2.90 per hour	3.60 per hour
Motor graders, small	1.20 per hour	1.60 per hour
Motor graders, medium	2.45 per hour	2.95 per hour
Motor graders, large	2.80 per hour	3.35 per hour
Scrapers, 4-yard	2.50 per day	....
Scrapers, 6-yard	5.00 per day	....
Scrapers, 8-yard	8.25 per day	....
Shovels, ⅝-½-yard	2.75 per hour	3.25 per hour
Air compressors, portable, over 75 cfm	0.70 per hour	1.10 per hour
Air compressors, portable, over 150 cfm	1.00 per hour	1.45 per hour
Air compressors, portable, over 210 cfm	1.40 per hour	1.90 per hour
Concrete mixers, 3½-S	1.75 per day	2.95 per day
Concrete mixers, 7-S	4.70 per day	7.20 per day
Concrete mixers, 14-S	7.50 per day	10.50 per day
Crushing screening plants, portable, including power and bins	4.50 per hour	5.20 per hour
Light plants, 1.5-kw	0.08 per hour	0.13 per hour
Light plants, 5.0-kw	0.13 per hour	0.23 per hour
Welders, electric, portable, 300-amp.	1.10 per hour	1.30 per hour

The Equipment Service of Region 5, U. S. Forest Service, of which S. B. Show is Regional Forester, is directed by Eugene E. Silva, Equipment Engineer, and Linné Ahlberg, Business Manager, under the general supervision of Assistant Regional Forester A. P. Dean in charge of the Division of Engineering.

YOU'LL FIND NO "OIL HOGS" HERE

NOT with Gardner-Denver Water Cooled Portable Compressors on the job!

Because they are fully water cooled, they run cooler—use less lubricating oil. Rarely is it necessary to add any oil between regular oil changes.

And because they run cooler, they deliver cooler air—cause less wear on hose.

You'll find Gardner-Denver "Portables" equally efficient in winter or summer—at high altitudes or low. In winter, warm water from the engine circulates through the cylinder jackets, thoroughly warming the compressor before it is started. In summer, the circulating water keeps the compressor cool.

Investigate these "oil saving" water-cooled compressors and other Gardner-Denver cost-cutting equipment. Write Gardner-Denver Company, Quincy, Illinois.

For faster drilling and extra maneuverability, even over the roughest ground, check the Gardner-Denver UM-99 Wagon Drill. Ability to handle full six-foot steel changes quickly, means faster drilling on deep holes.

GARDNER-DENVER

Since 1859

SAND'S Aluminum Line & Surface LEVEL

Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
8831 Gratiot Ave. Detroit 13, Mich.

How Air Maps Aided In Location of Bridge

(*Continued from page 2*)

essential features of the plan and how it will affect their city. This task is made easier by the proper use of aerial photographic maps which help to visualize the engineering drawings.

The all-seeing eye of the aerial mapping camera so completely and faithfully records every topographic feature within its field of vision, and does it so economically that the highway planner can hardly afford to do without its benefits in supplementing information shown on conventional maps and plans.

A Bridge Location Problem

The photograph on page 2 illustrates the application of air mapping in determining the location for a large river bridge and its approaches, costing approximately $1,200,000, adjacent to a city of 20,000 population.

The essential features to be noted in the photograph are: (1) the proximity of the central business section to the main navigation channel of the river; (2) the navigational requirements fix the elevation of the main channel span high above the level on which the central business area is located; (3) the old bridge was landed at the Main Street level at a point only one block from the bank of the river. This was accomplished by introducing two right-angle turns in the alignment of the south approach to the main span. These sharp turns were the cause of several accidents, including fatalities, over a period of some years, so they could be definitely rated as hazardous features, which could not be tolerated in a new structure; (4) local efforts at first were directed to landing the bridge on Main Street, the same as the old bridge; (5) the northerly approach to the old bridge crossed two important railroads at grade.

Solving the Problem

It was previously determined that the requirements of the War Department for navigational clearance vertically would be about 70 feet above normal water level, and that horizontal clearance would be about 450 feet.

A traffic analysis showed approximately 1,800 vehicles as an annual daily average, a substantial portion of which were local in character having either their origin or destination in this city of 20,000.

With this basic information, a preliminary investigation of several prospective routes was made in the field by engineers of the Minnesota Highway Department. By use of existing maps supplemented with air maps, the comparative advantages and disadvantages of the various routes were weighed and considered.

Studying the Air Map

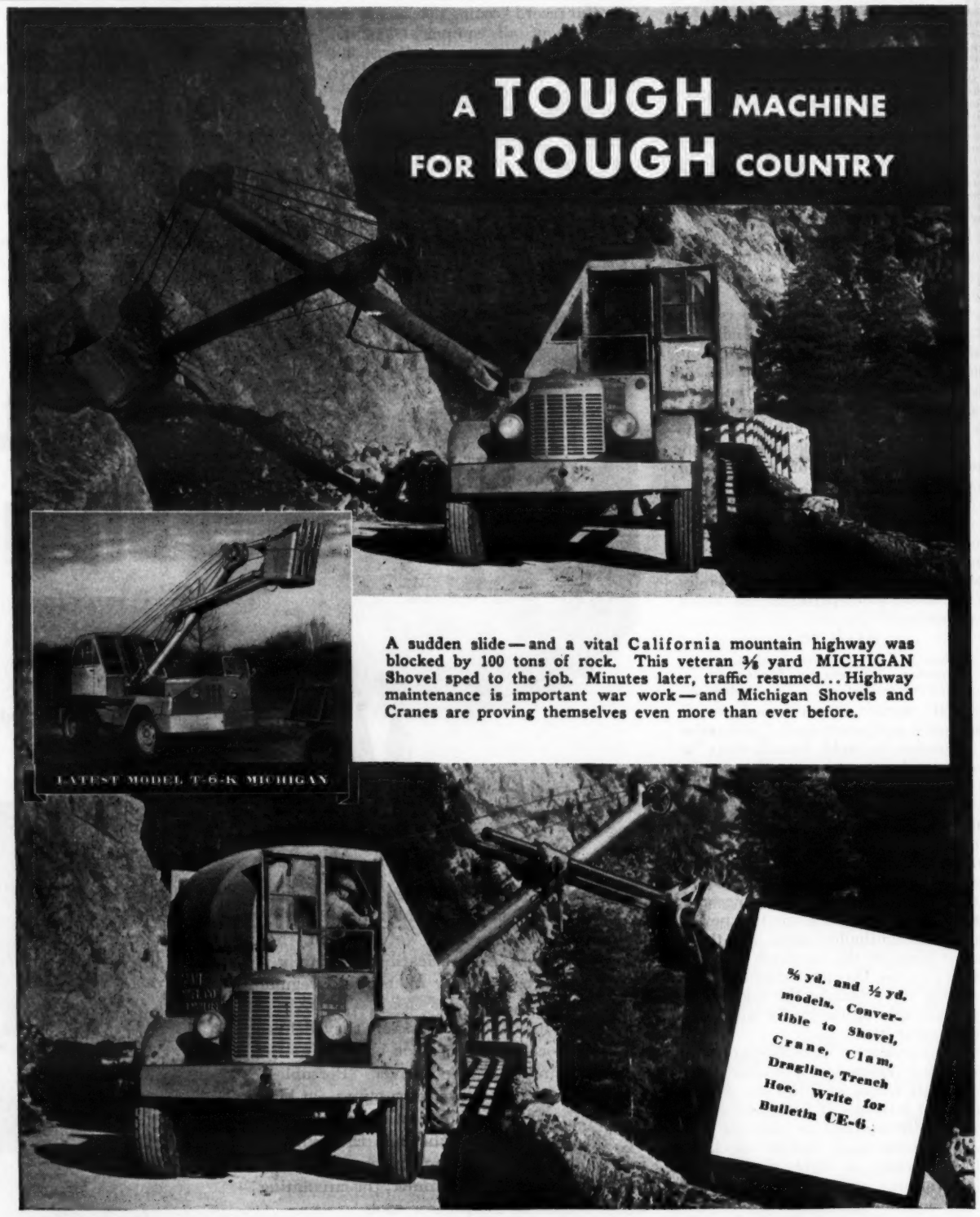
Most of the local interest advocated a Main Street location (Line "B") since they reasoned it was desirable to land the bridge in the heart of the central business district. To meet the requirements for vertical clearance over the main channel of the river and to obtain satisfactory approach grades, it would be necessary to extend the bridgehead to Fourth Street with the grade line of the south approach passing approximately 18 feet above the level of Third Street. This elevated structure would have adversely affected the use of this portion of Main Street which is lined with retail stores and shops. The acquisition of air rights for such an elevated structure would have been relatively expensive. Traffic congestion at the bridgehead at Fourth and Main Streets would have been serious.

A line such as "C" near the easterly edge of the central business district would conflict with certain industries.

A site such as "D" would permit landing the bridge at Third Street, since the course of the river opposite this point would provide sufficient distance to permit it. Line "D," however, is some distance from the central business area and would be inconvenient for local traffic which forms the major part of the total traffic.

Line "A" would place the bridgehead on Fourth Street at the westerly edge of the central business district, comparatively convenient for local traffic. Here the property affected by the elevated structure between the bridgehead and

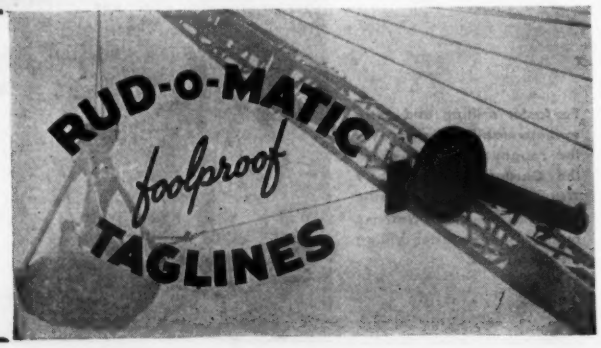
(*Concluded on next page*)


A TOUGH MACHINE
FOR ROUGH COUNTRY
LATEST MODEL T-5-K MICHIGAN
A sudden slide—and a vital California mountain highway was blocked by 100 tons of rock. This veteran ¾ yard MICHIGAN Shovel sped to the job. Minutes later, traffic resumed... Highway maintenance is important war work—and Michigan Shovels and Cranes are proving themselves even more than ever before.
¾ yd. and ½ yd. models. Convertible to Shovel, Crane, Clam, Dragline, Trench Hoe. Write for Bulletin CE-6.
MICHIGAN
POWER SHOVEL COMPANY
BENTON HARBOR MICHIGAN

The Rud-o-Matic Tagline is operated on a spring principle and maintains at all times a positive tension sufficient to steady a clam shell bucket under any and all conditions, and will operate perfectly with the boom at any angle. It eliminates all the grief usually encountered with the average tagline as there are no weights, tracks, pins, carriages, or sheaves to wear out or to get out of order. Because of the large bearings and fewer sheaves, the saving on cable alone would eventually pay for it.

Tagline is complete with fair lead and cable attached and can be installed in less than one-half hour. Most of the crane manufacturers have adopted the Rud-o-Matic as standard equipment.

McCaffrey-Ruddock Tagline Corp.
2121 E. 25th St., Los Angeles 11



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desires position

Recently completed three years' major project in Hawaii; 25 years' experience in general construction field including industrial plants; hospitals; tunnels; bridges; docks; sea walls; intakes; deep cofferdams; marine floating equipment. Will go anywhere.

Address Box 249
CONTRACTORS AND ENGINEERS MONTHLY
470 Fourth Avenue, New York 16, N. Y.

Bridge Site Selected By Use of Air Maps

(*Continued from preceding page*)

the river channel was of such character as to permit acquisition of air rights at relatively low cost.

The crossing of the railroad tracks on the south approach would be at nominal cost since this part of the approach would necessarily be structure anyway. The angle of crossing of the main channel and the location of piers adjacent to the main channel would be favorable. The crossing of the north or secondary channel of the river would likewise be advantageous. The crossing of the main railroad line at the northerly side of the river valley was favorable for development of a grade separation, and the nearby junction with the trunk highway would be satisfactory from the design standpoint. Line "A" also had the advantage of permitting unobstructed use of the old river crossing during construction.

After careful review of the several sites just briefly described, Line "A" showed a preponderance of favorable engineering and economic factors, and was accordingly selected by the Minnesota Highway Department for presentation to the city officials and interested groups of citizens for their consideration.

Selling the Project Locally

Aerial maps were a potent factor in finally obtaining approval. Although local sentiment had previously considered a Main Street location essential to the future welfare of their city, a better understanding of all the factors entering into consideration of the various routes convinced them of the superior advantages of Route "A" which was finally adopted.

Conducive to this understanding were the aerial maps which were helpful to all concerned in weighing the relative importance of the many factors involved in determining the best site for this major structure in the highway system serving this community.

Spiral Thread Coupling For Dynamite Charges

Engineers and contractors who have the problem of blasting at river crossings for pipe lines, and other submarine and dredging work will be interested in a 15-page booklet available from the Hercules Powder Co., Wilmington, Del., describing the construction, assembly and operation of Spiralok, a heavy paperboard cartridge which can be fitted together to form a rigid column of explosives. A series of photographs show how Spiralok can be quickly assembled by one man, joined together by means of grooved sleeves to provide an unbroken waterproof covering along the entire length of the explosives charge. There is also a detailed account of the quickest and most efficient method of placing charges under water, with accompanying photographs illustrating various steps in the operation. Hercules Vibrogels and gelatin dynamites are available in Spiralok cartridges, in sizes 2 x 16 inches, 2¼ x 24 inches, 3 x 24 inches, and 4 x 24 inches.

Copies of this booklet may be obtained by writing direct to Hercules and mentioning this review.

Larger Truck Tires Now Contain Synthetic Rubber

As a result of a government directive, necessitated by diminishing crude rubber stocks, larger-size highway truck tires are now being made with synthetic rubber, employing S-5 (100 per cent synthetic tread, natural rubber cord-body) or S-7 (65 per cent natural rubber, 35 per cent synthetic), according to an item in *The Rubber News Letter*, published by The B. F. Goodrich Co., Akron, Ohio. The sizes affected are 8.25-20 10 and 12-ply; 9.00-20 10 and 12-ply; 10.00-20 and -22 12-ply; 11.00-20 and -22 12-ply. It is stated that rayon cord is now used in all these sizes.

"That's My Seal of Satisfaction"

YES, sir, I don't have to worry about the capacity and performance of my concrete mixers and pavers. Not when they bear that A.G.C. Rating Plate. And let me tell you, that means something these busy days with a million details to watch—and no time to spare for watching.

When I estimate a job, I know exactly what my mixer and paver capacity is. When I'm looking for mixers and pavers that will help me make exact estimates, I get the ones with the A.G.C. Rating Plate that guarantees reliability in action and production.

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Affiliated with the Associated General Contractors of America, Inc.

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Construction Mach. Co., Waterloo, Iowa
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The Lakewood Eng. Co., Columbus, Ohio
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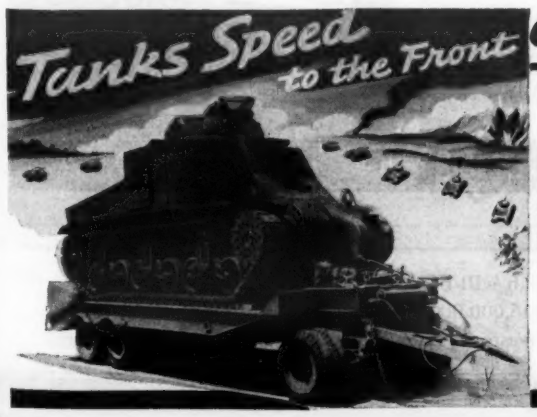
The Jaeger Machine Co., Columbus, Ohio
The T. L. Smith Company, Milwaukee, Wis.
The Knickerbocker Co., Jackson, Mich.



on ROGERS TRAILERS

GETTING there "fustest with the mostest" as one early American General aptly phrased it, is battle strategy that really conquers!

In the lightning speed of mechanized warfare tanks ride "Pick-A-Back" to battle on ROGERS TRAILERS so their fighting capacity is unimpaired. Special ROGERS TRAILERS retreive disabled tanks so they can be repaired and rushed into battle again.

EXPERIENCE builds 'em PERFORMANCE sells 'em.

ROGERS TRAILERS are doing a real war job at home and abroad. New models which will be available to industry when war contracts are completed will be even better-engineered and more efficient than their predecessors.

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ALBION,
PENNA.

Avoid Waste in the USE OF PAPER!
To Aid the WAR EFFORT—
☆ Every pound of paper must be used wisely.
☆ We must salvage paper normally thrown into the waste basket.
☆ Avoid waste. Salvage paper for military use.
CALL A COLLECTOR!

The new Hyster Lift Truck.

Dual-Purpose Truck For Yard Lifting Jobs

A working speed of up to 12 miles an hour either forward or back, ability to turn in its own length of 117 inches, thus providing easy maneuverability, an overall width of only 60 inches, and a capacity of 7,500 pounds are features of the new dual-purpose Hyster 75 Lift Truck which is designed to handle short-distance transportation around yards and shops or construction jobs, as well as lifting and stacking materials.

Streamlined in design, with operator comfort and conventional automobile controls, this new unit operates on three large pneumatic tires and easily negotiates rough floors or unpaved storage areas. The manufacturer states that a loaded Lift Truck can go anywhere, from the standpoint of tractive effort, that an automobile truck can and will climb comparable inclines.

On standard models the height of lift is 108 inches from the ground to the under side of the load, but this distance can be altered on special orders and adapted to special material-handling problems.

Further information on the Hyster 75 Lift Truck and its many uses may be secured direct from the Willamette Hyster Co., 2952 N. E. Clackamas St., Portland 8, Ore. Just mention this item.

McDonald Expands Plant; Safety Hats Now Available

The B. F. McDonald Co., manufacturer of specialized safety devices and clothing for workers in the industrial and engineering fields, is now located in its new headquarters, occupying an entire block between 51st and 52nd Sts. on South Hoover St., Los Angeles, Calif., according to a recent announcement. The building, which provides 30,000 square feet of floor space for manufacturing, assembling and executive departments, has been temporarily remodeled and will be completely reconstructed as soon as building materials are available. A feature of the alterations will be a large auditorium for the demonstration of first-aid and safety procedures.

It is also announced that this company has resumed manufacture and sale of its "T" safety hats. Weighing only 11¾ ounces with its floating head band, the "T" safety hat is made of a special aluminum alloy which is reported to give it maximum strength at minimum weight. A new feature is an adjustable headband, which is quickly interchangeable with the two shell sizes available: small for sizes 6⅝ to 7⅛, and large for sizes 7¼ to 7⅝. Copies of a new bulletin describing the "T" hat may be obtained by writing direct to the manufacturer at 5112 So. Hoover St., Los Angeles 37, Calif.

There is no job too big or too small for Brooks LOAD LUGGER and its "litter of bodies." It cuts costs on contracts.

Speeding production on the home front by more efficient movement of materials and supplies will go a long way toward *knocking the Axis off its bearings* and hastening the day of victory.

One LOAD LUGGER mounted on the chassis and operating with 5 to 10 dump buckets can do as much as a whole fleet of ordinary trucks . . . increasing daily haulage, saving time and conserving manpower.

Write for Catalog No. 44

706 Davenport Road, Knoxville 8, Tenn.
Distributors in all Principal Cities

Brooks EQUIPMENT AND MFG. CO.

CONTRACTORS
Make Those
Small Blacktop Jobs Pay

With This $1200 DISTRIBUTOR

This efficient, low-cost Distributor opens up *new fields of profitable black top work for Contractors*--County and Township Roads, City Streets, Alleys, Sidewalks, Parking Lots, Playgrounds, Driveways and small airports.

The 600-gallon Model SJ pictured here has a 100 G. P. M. pump powered by a 15 H.P. engine. Handles any type material through spray bar lengths up to 12'. The two powerful burners pouring heat through 5" flues assure fast heating. Single lever controls all pumping operations, including Hand Spray.

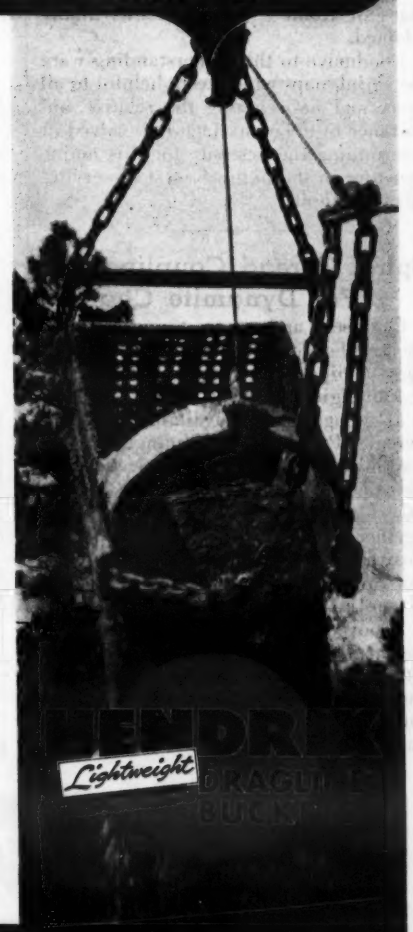
The Model SJ can be furnished for truck mounting, or on its own running gear for towing.

There is a Dealer in your immediate territory. Write for Catalog RS-2142.

OTHER PRODUCTS
Asphalt Distributors • Tar Kettles • Burners • Street Flushers • Spray Units
Supply Tanks • Surface Heaters • Shoulder Rollers

Standard Steel Works

Get a
pay load every trip...
even in wet digging



★ It's easy enough to move *more material, faster,* when you're using HENDRIX Lightweight Buckets! So step up your yardage in all kinds of digging by replacing old buckets with HENDRIX Lightweights. You gain a 20% to 40% weight advantage over other buckets, type for type . . . which permits the use of larger buckets on your machine, regardless of normal capacity . . . larger buckets on long boom operations, too. In wet digging, you get extra bonus pay loads by leaving the water in the pit. Manganese steel chains, fittings and reversible tooth points are standard equipment on all buckets. Write for literature or ask your dealer.

Three Types
light, medium and heavy duty
⅜ to 20 cubic yard sizes

★

THE FIGHT'S NOT OVER YET!
KEEP SCRAPPING . . . BUY BONDS

DESOTO FOUNDRY, INC. ★ MANSFIELD, LA.

The Fifth War Loan will begin June 12th, closing July 8.
The goal will be $16,000,000,000, of which 6 billions will be sought from individual investors. Back the attack! Buy more than before!

Treated Timber Used Widely on Alaska Hwy.

In addition to the large number of treated-timber bridge structures on the Alaska Highway, an interesting article in a recent issue of *Wood Preserving News*, published by the American Wood-Preservers' Association, Chicago, Ill., reports the use of 12,000,000 board-feet of pressure-treated timber in culverts on the route to Alaska.

The installation of small drainage structures was often complicated by the unstable foundations in swamp and muskeg and in winter by icing conditions under which the streams froze from the bottom up, thus raising the water higher and higher. As might be expected in the hurried construction of the pioneer road during the first season in an unknown region, there was considerable guess work about the location of temporary log culverts and the sizes required. Many of these were later lost by floods and undermining scour during the spring thaw of 1943.

Since then many hundreds of pressure-treated wood culverts have been built in place of the temporary grade openings. These treated culverts are of two types, round stave pipes and rectangular laminated boxes, and were built of Douglas fir entirely fabricated before treatment. The pressure treatment consisted of impregnation by an empty-cell process with a final retention of 10 pounds of preservative per cubic foot of wood. The treated material was shipped to Dawson Creek, British Columbia; Whitehorse, Yukon Territory; and Haines and Valdez, Alaska, for distribution to construction sites along the highway.

Both types of culverts were assembled at the point of installation, using steel bands to fasten the round pipe staves together and long steel spikes or drift pins in the case of the boxes. Lumber of 4-inch thickness, framed with an interlocking joint, was used in the latter. Both designs have been used for many years in state highway work in the northwestern section of the United States. In general, 3-foot diameter was the principal size for the round culverts, while the box-culvert sizes included standard openings of 3 x 3 feet, 4 x 4, 6 x 4, 6 x 6, and 8 x 8 feet. Approximately 12,000,000 board-feet of pressure-treated wood was required for the construction of permanent culverts on the Alaska Highway.

Roadway and Runway Soil Mechanics Data

Bulletin No. 71-A prepared by Henry C. Porter, Research Engineer, Texas Highway Department, and issued by the Texas Engineering Experiment Station, deals with the subjects of density, moisture content, and strength of consolidated clay soils, and moistures in clay soil beneath pavements. This is the last of a series of six bulletins on roadway and runway soil mechanics.

In his foreword, Mr. Porter points out that the rapidly increasing traffic loads on both airport and highway pavements are emphasizing more than ever before the necessity for greater durability in the substructures. Clay soils under pavements have caused much grief in the past, but in some areas there is no other material to use. Data contained in this bulletin indicate that clay soils can be made to give greater service by densely consolidating them and then preventing high moisture contents and rapid moisture fluctuations from developing therein.

It also appears that reliable and practical tests for predetermining the load-carrying power of consolidated clay soils can be made in much the same manner that compressive strength tests are made on some of the processed building materials.

Copies of this bulletin may be secured by interested contractors and state and county highway departments from the Texas Engineering Experiment Station, A and M College of Texas, College Station, Texas.

Would Pay for Quite a few **BUCKEYE SPREADERS**

In answer to a direct question on what his Buckeye Spreader had saved him over previous methods of spreading, one contractor wrote, "Quite a few thousand dollars."* Other users made the comments listed at the right.

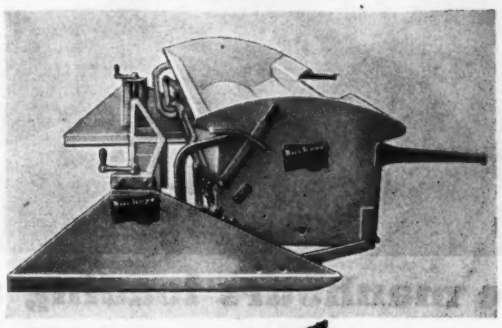
Accuracy is the keynote behind Buckeye Spreader success. A spirally fluted, transmission-driven, adjustable speed feed roll grips the material and distributes it positively through a measured gate opening. This insures a "metered" flow that spreads material within a variation from calculated volume of as little as 1% to 3% on many jobs. The Buckeye Spreader is far more than a truck tailgate attachment — it is a *Spreading machine* from the ground up. Complete data in 8 PAGE BULLETIN. Write for copy.

"Save 30 to 50% on materials." • "Saves approx. $25.00 per mile." • "This is the best spreader I ever used." • "Saves at least 20% on material." • "Saves $32.00 per mile." • "Accurate within 2%."

*Signed statements on file. Photostatic copies available.

STRIKE-OFF ATTACHMENT

This attachment permits spreading base courses to 6 inches depth. Blade is mounted on skids and is adjustable by hand cranks.



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Convertible Shovels
Spreaders
Power Finegraders

Buckeye

Trenchers
Tractor Equipment
Road Wideners

MARTIN TRAILER

—4 models—
7, 10, 15 & 20-ton capacities

Don't say, "We want a TRAILER." Say: "We want a MARTIN Trailer."—This will insure your getting a trailer that's EASY LOADING, POWERFUL, FAST, SAFE, LONG-WEARING and ECONOMICAL. . . . .
Sold by all Caterpillar Distributors.

WRITE FOR BOOKLET

Martin Machine Company, Kewanee, Ill.

FEATHER the nests of our multiplying warbirds—or there will be no nests left to any of us. Buy Bonds. CONSERVE, stimulate, protect—all in one—buying Bonds.

Checking Welders In Case of Trouble

(*Continued from page 35*)

burns out does not necessarily mean that the coil which burnt out was faulty; the failure may actually have been caused by an adjacent or opposite coil not carrying its share of the load. It is generally better and more economical simply to replace any coil giving trouble than to attempt any make-shift repairs.

Ordinarily, a commutator will give many hours of service before attention is required, but it finally becomes rough or grooved where the brushes rub. When this happens, the machine must be dismantled, the armature removed, and the commutator turned in a lathe, taking a fine cut at high speed. Before assembling the machine, the mica insulation between the commutator segments should be undercut approximately 3/64 inch. If the commutator is only slightly rough, it can be improved by sanding with No. 00 sandpaper with the machine running and the brushes lifted. Be sure to polish it afterward with a soft cloth to remove all abrasive particles. Grease on commutators is almost invariably due to over-greasing the bearings. The first thing to do is to clean the commutator carefully, and then remember to grease more sparingly thereafter.

Burn-out of the relay may be caused by a loose fastening of the power wires to the studs at the driving motor, and this loose connection results in heating and possible damage. Therefore, see that the connection studs are kept tight.

If there is heavy sparking at the brushes, or if the brushes wear prematurely or are crooked, the usual cause is overloading of the generator. Once this has happened, the insulation between the interpole coils or series field coils may burn out, causing arcing and poor commutation even after the overload is removed. When sparking occurs, the welding load should be reduced at once and, if it continues, a check made for the cause. Excessive or insufficient brush-spring tension might also be the cause, in which case the spring tension should be tested and, if improper, be corrected. Another reason for this might be that the brushes are improperly seated or not equally spaced. In this case, the brushes should be cut and replaced properly. A high commutator bar may be the underlying cause and may be corrected with a commutator stone or by removing the armature and turning it in on a lathe. Brushes which are worn crooked or wedge-shaped indicate a loose connection, which forces the current to flow through the side of the brush, with consequent wearing away. A correction of the connection will eliminate further uneven wear. A short circuit or open circuit in the armature may also cause excessive sparking.

If the welding arc is loud and spatters excessively, it may be due to a too-high current setting, or the polarity may be wrong. Check the setting and current output with an ammeter, and check the polarity. If this fails to reveal the cause of the difficulty, reverse the polarity or try an electrode of the opposite polarity.

If the motor on an electric-driven welder slows down or quits under a heavy load, it may be that sufficiently large wires are not used to carry the power current properly without an excessive voltage drop, the fuses may be too small to accommodate the amperage drawn by the motor, the supply transformer may be blamed, or the power supply itself. In order to be sure that the power supply is ample, place a suitable voltmeter directly across the motor terminals while the welder is under load or during starting. If there is a voltage drop exceeding 10 per cent, the difficulty must be remedied accordingly.

If the electric motor vibrates excessively when first started, the rotor may be loose on the shaft, the end rings of the rotor cracked loose from the rotor boss, a shaft bent, the rotor assembly out of balance, or because the machine is mounted so solidly that the vibration cannot be absorbed from the assembly. In the case of rotor trouble, which is very rare, it is recommended that the complete armature assembly be returned to the manufacturer for correction. A

(*Concluded on next page*)

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Write for literature and prices.

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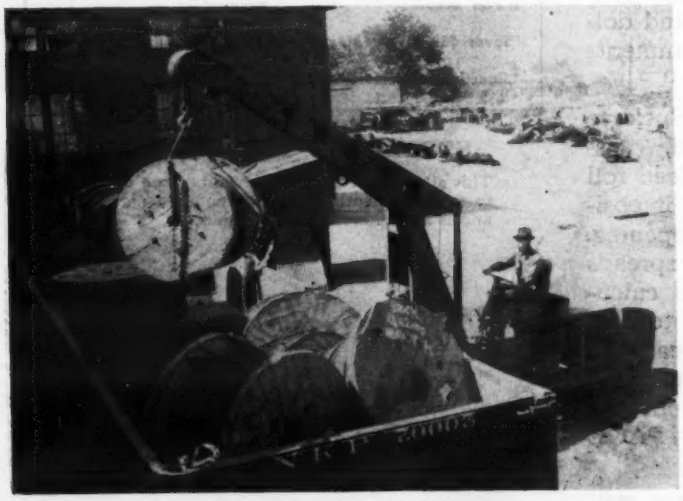

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GRIFFIN WELLPOINT CORPORATION

Help in Operation And Care of Welders

(*Continued from preceding page*)

noticeable vibration can sometimes be stopped by changing the location or position of the welder. A temporary vibration when the motor is picking up speed or is retarding when stopped sometimes occurs. This periodic vibration at certain critical speeds need cause no concern as manufacturers balance the armature very carefully for the particular speed in revolutions per minute at which it normally runs.

A gasoline-engine "ping" under load is usually due to a slightly too far advanced spark setting, and can be overcome on most engines by slightly turning the distributor housing in the same direction as the rotor turns. Engine overheating results from insufficient supply of water in the radiator, the spark retarded too much, a lean carburetor setting, or severe overload. If the engine quits entirely under load, it may be that an excessive load is being placed on the generator; the governor action may not be snappy enough; or poor fuel may be the cause. Try increasing the speed of the engine and be sure that you are not asking too much of the generator. The amperage output should not exceed the normal full-load rating found on the name-plate of the welder. Before making any adjustment of the governor of a gas engine used on the generator drive, make absolutely sure that the ignition and carburetion of the engine are in first-class condition, the fan belt tight, and that the governor linkage is not binding at any point.

Occasionally an engine develops a bad knock within a few weeks after it is placed in service and the immediate conclusion is that the bearings have gone bad. It is usually found, however, that this is caused by the combustion chambers completely filling up with carbon from the oil and gasoline. The only remedy is to remove the cylinder head and to scrape out the carbon or to use one of the standard products for carbon removal that may be introduced through the carburetor or added to the crankcase oil and possibly also to the gasoline. Thereafter, it may be advisable to use a slightly heavier oil in the crankcase as the break-in oil is invariably of very light grade and should be changed before the welding machine is operated more than 25 hours.

Helpful Literature

In the case of electric welders, as with all equipment used in the construction field, the best and most effective way of securing the longest service life is to follow the manufacturers' instructions in the installation, operation, lubrication, and regular inspection of the machines. This article is intended as a general guide to the care of gas-engine and electric-motor-driven electric welders. Each specific make may have special points in its care which its manufacturer's instructions will stress. All manufacturers maintain service departments, and welcome inquiries or requests for help and advice in the care and operation of their machines. It is always a wise practice to give complete name-plate data from any machine about which you want advice, especially the serial number. This enables the manufacturer to identify the size, model, and type of machine, and helps to avoid much needless delay in passing on the requested information and putting the welder into service.

Among the literature on electric welders which will aid you in maintaining and servicing your machines are: "How to Maintain Arc Welders", published by the General Electric Co., Schenectady, N. Y.; "Simple Service Suggestions" and "The Welders' Vest Pocket Guide", both available from Hobart Bros. Co., Troy, Ohio; "101 Welding Ideas on Maintenance" and instruction manuals for all types of Lincoln arc welders, which may be secured from Lincoln Electric Co., 12818 Coit Road, Cleveland 1, Ohio; "Maintenance Instructions", available from Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York City; and the "Universal Arc Welders Instruction Manual", issued by the Universal Power Corp., 4897 Euclid Ave., Cleveland 3, Ohio.

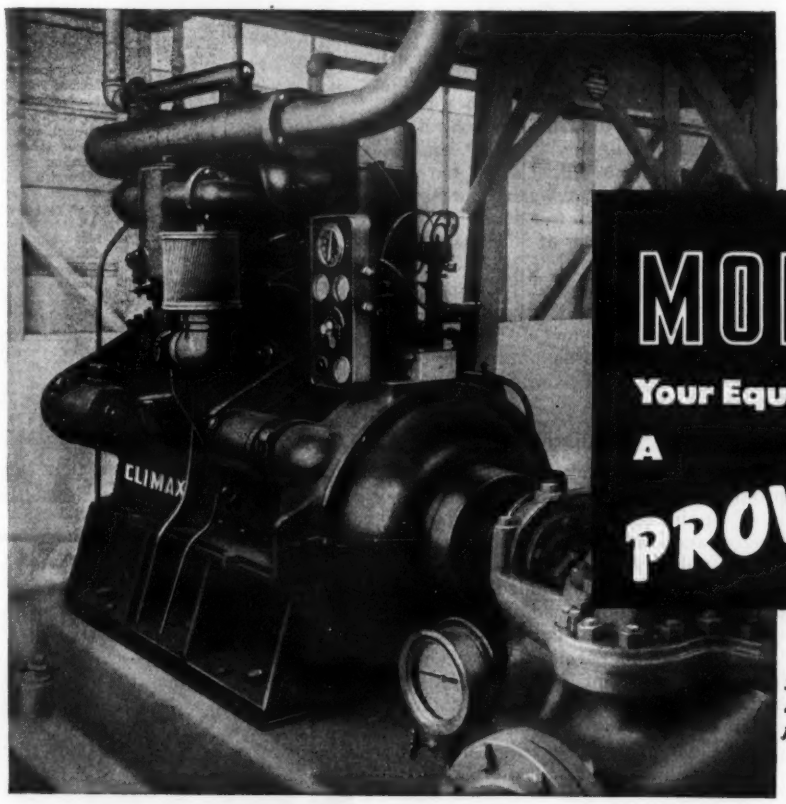
To the engineers of these companies and of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Penna., and Harnischfeger Corp., Milwaukee, Wis., we acknowledge the assistance rendered by the material and suggestions they furnished in the preparation of this article, which we hope will aid in keeping America's electric welding machines working for victory.

New Indicator Shows Level of Drum Contents

Announcement has been made by the Techtmann Industries, Inc., 828 North Broadway, Milwaukee 2, Wis., that the patented U-C indicator, which has been available for several years for 55-gallon drums is now available for 30-gallon steel drums. The U-C tells at a glance the "inside story" about the liquid level content of drums containing oils, solvents, and similar materials, and eliminates the need for tapping, measuring, or guessing, by providing a constant check on the supply.

The manufacturer states that the U-C indicator is as easy to transfer as a faucet; the indicator is merely screwed into the drum faucet opening, and then the faucet screw into the opening on the indicator body. When the drum is empty, the entire assembly is removed and attached to a full drum.

Further information on this device may be secured direct from the manufacturer by referring to this item.



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A Climax engine will put new life into existing equipment, multiply its output and lengthen its productive life. The changeover can be made with a minimum of difficulty and at moderate cost. For new equipment, a Climax engine may be specially designed, equipped and rated for the job, then standardized.

For Stationary Installations these engines provide an unfailing source of power and give a lifetime of trouble-free service. They operate at low, medium, constant or variable speeds and burn natural gas, butane or gasoline. Climax engines are simple and easy-to-understand. There are no delicate adjustments to be made, no exacting tolerances. Every part subject to wear can be replaced easily and inexpensively by regular mechanics. Specially trained men are not needed.

For Portable Service Climax engines are compact, adaptable and easy to install. They are built to take punishment and frequent overloading without impairing their output or efficiency. Their design flexibility and ease of relocation permit them to be hooked up to multiple installations, and make profits the whole year round.

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CLIMAX ENGINES are 4, 6, 8 and 12 cylinder gas engines with ratings from 8 to 495 h.p. Climax Diesel engines are made in two models rated at 22 and 44 h.p. The gas engines operate on natural gas, butane or gasoline.

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Special Equipment Movable Bridge Machinery

Write for descriptive catalogs.

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Distributors in Principal Cities

New Concrete Road To Serve War Plant

(*Continued from page 54*)

excavation and a ¾-cubic-yard Lorain clamshell most of the bridge and culvert excavation. Two RD8's were used as pushers to expedite loading, while one RD7 with a LeTourneau bulldozer and an RD8 with another LeTourneau bulldozer spread materials at the fills and assisted otherwise in the operation. Two International TD-14 tractors pulled the tamping rollers while a Caterpillar, an Austin-Western, and an Adams motor grader shaped and maintained the grade.

A 6-inch sub-base was built of A-4 or better soil and compacted by sprinkling and rolling, after being thoroughly mixed by a disk harrow pulled by an Allis-Chalmers tractor. Water for sprinkling was hauled in 1,000-gallon metal tanks mounted on Ford trucks.

A Ted Carr form grader cut the trench in which the 9-inch Blaw-Knox forms were set. The fine grade was cut by a Surgrader, which was adjusted to either the 22 or 24-foot width as needed, and rolled by an Austin 3-ton gasoline roller. The checking planer was pulled by an early model Caterpillar tractor.

Two Koehring 27-E pavers poured the concrete from their positions on each side of the lane being placed or, on part of the job, from a completed slab where they worked in echelon, with the inner paver slightly in advance of the one farther from the work, and discharged into the same lane. Four puddlers shoveled the fresh concrete into position to be finished by the Lakewood and Blaw-Knox-Ord finishing machines operated one behind the other with the front machine equipped with twin vibrating tubes.

Since neither the pavers nor the trucks traveled in the lane under construction, two men set the premoulded expansion joints, at 90-foot intervals, well in advance of the concrete. Grooves for the center strip were cut by a disk machine and two men handled the setting of the strip and the placing of the transverse dummy joints every 15 feet. Two finishers using drag straight-edges followed two men who worked the longitudinal float from a rolling bridge and two men finished joints and edges.

Four men handled the placing of the black-oxide center stripe by sprinkling the dry powder between wooden frames and floating it into the fresh concrete by hand as soon as the surface water had subsided. These men also assisted the one man whose job it was to spray on the Satisfaction curing compound which was carried in a 50-gallon drum on a rolling bridge and sprayed on to the finished concrete by a Wisconsin-gasoline-engine-powered pump.

Batching and Hauling

The contractor erected his batching plant on a government reservation near one end of the job which resulted in approximately a 4-mile average haul, and an average of 15 Ford and Chevrolet trucks with a variety of bodies was used, each hauling two batches. Sand from the Standard Sand Co. of Tulsa and crushed limestone from the contractor's own quarry were shipped to the plant site by rail and unloaded to the two-compartment C. S. Johnson batcher by a P & H 600 crane with 1-yard Blaw-Knox clamshell bucket. A small International tractor with bulldozer assisted in moving cars and cleaning up the stockpiled materials. OK cement was furnished in bulk and weighed in 2-wheel concrete carts on Fairbanks platform scales before being dumped on top of the aggregates in the truck bodies. The batches, each giving a yield of 29.7 cubic feet, had a cement content of 1.3 barrels per cubic yard and a water content of 5½ gallons per sack of cement.

The large yardage of sidewalk was fine-graded by hand after being shaped by a motor grader and the concrete placed by one of the pavers running alongside the walk and fed by batch trucks. The walk was poured in one course, struck off by hand, and finished by hand floats.

Sodding

Acceptable sod was located in close proximity to the job, plowed into strips by a 3-point plow pulled by a Farmall tractor, and loaded by hand. The same tractor pulled a gang disk harrow over the entire area to be sodded and then pulled a 3-point plow made from an old rooter frame which cut trenches 18 inches apart and parallel to the center line of the road. Sprigs were planted by hand in these trenches, with a 2-inch square clump set every 12 inches in each row. The trenches were refilled by hand raking, and the entire sodded area rolled by a Culti-Packer and sprinkled with water from 1,000-gallon tanks mounted on Ford trucks.

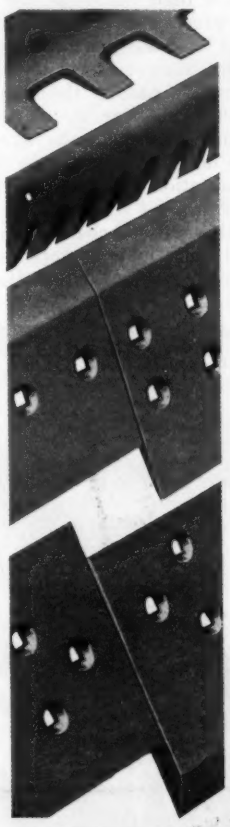
Major Quantities

The major quantities in the five contracts which constituted this project were:

Excavation	350,000	cu. yds.
Concrete pavement, 9-7-9-inch	258,168	sq. yds.
Old pavement removed	76,268	sq. yds.
Subgrade treatment	282,893	sq. yds.
Concrete in bridges	1,647	cu. yds.
Structural steel	715,000	lbs.
Reinforcing steel	215,600	lbs.
Concrete sidewalk, 4-inch	8,870	sq. yds.
Sodding	309,900	sq. yds.
Overhaul (Sections of 1,000 feet) (Free haul was 500 feet)	584,890	sec.yds.
Black-oxide stripe, 6-inch	196,400	lin. ft.

Personnel

The five contracts which resulted in the completion of this project were all awarded to the Standard Paving Co., of Tulsa, Okla., on low bids aggregating $1,133,500. Work was started in April, 1942, and was completed late in 1943. R. E. Stokes was Superintendent for the contractor and James F. George was Resident Engineer for the Oklahoma State Highway Commission, of which H. E. Bailey is Chief Engineer and John J. Stobaugh, Jr., Construction Engineer.



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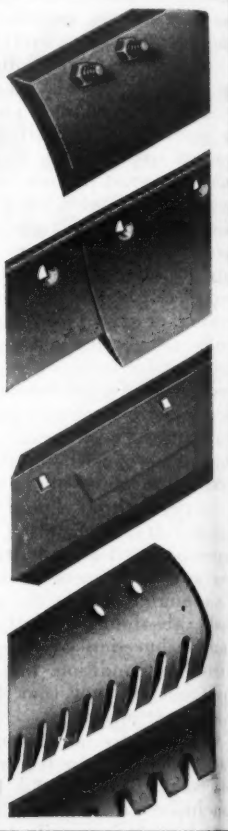

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Concrete Reinforcing Studied by Industry

A basic study of the uses of steel bars for concrete reinforcement is being inaugurated by a Committee on Reinforced Concrete Research recently organized by the American Iron and Steel Institute. Membership of the committee includes representatives of twenty-one producers of both new billet and rail-steel concrete reinforcing bars. To plan and supervise the investigations, R. R. Zipprodt, who has had many years of experience in concrete research and design, has been employed as research and consulting engineer.

The Committee has outlined an initial program of work covering a minimum of three years. In general, it is planned to study the extent of any gaps which may exist in the technical data on which design regulations and specifications are customarily based. It is then proposed to initiate programs of research for the purpose of developing new test data or of supplementing existing data.

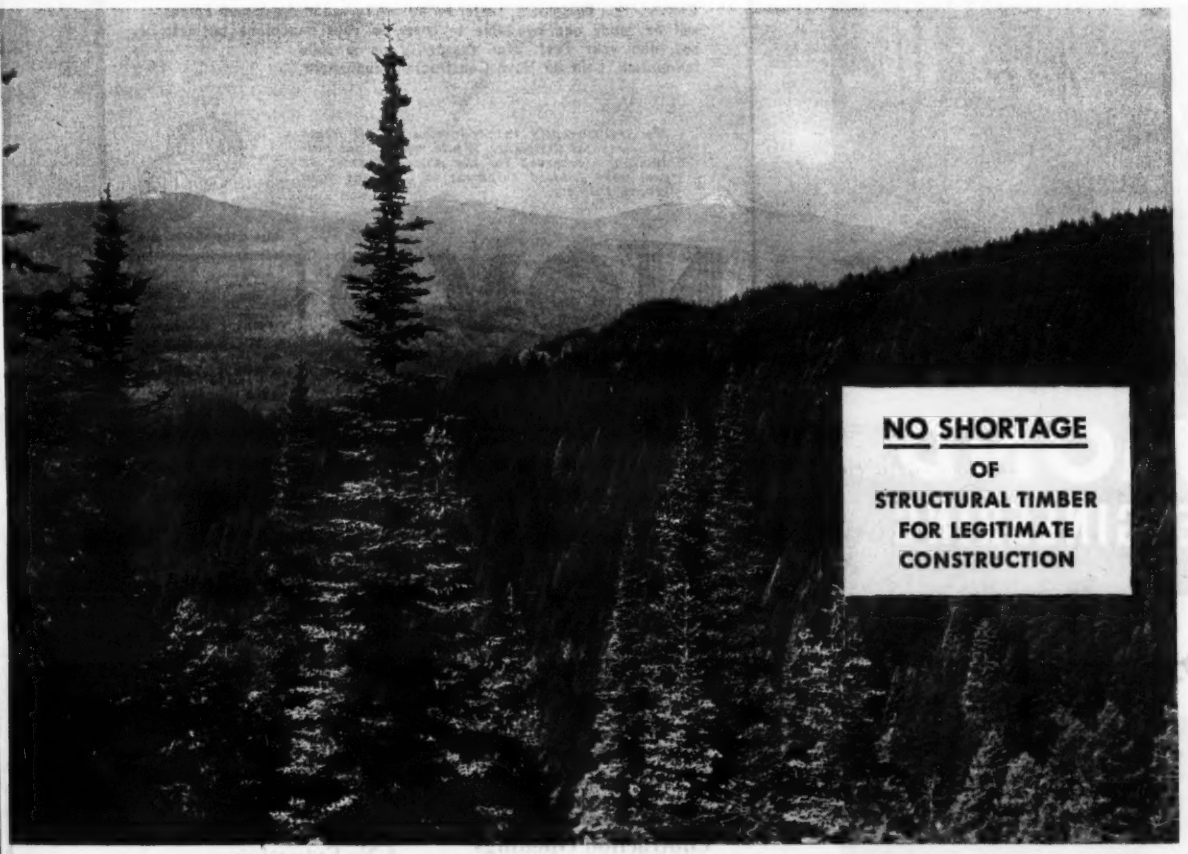
Work is already under way on a comprehensive investigation of problems relating to the proper design of square and rectangular footings. No research work on the design of footings has been reported since 1913, although since then many major improvements have been made in materials utilized in reinforced-concrete construction.

A second project will involve the investigation of unit stresses permissible in the design of reinforced-concrete slabs and beams. This study aims to determine the extent to which the ratio of slab thickness to span affects the unit stresses in the slab and consequently its deflection. It will also investigate the extent to which the span of slabs or beams should be limited by the size or type of reinforcement used. A collateral phase of that project will be a study of the effect of plastic flow, particularly on structural members subject to their own dead weight as well as uniformly distributed live loads.

Classification of all types of deformed bars which may be developed as a result of the concrete reinforcing bar industry's purpose of developing a standard or universal type of deformed bar will be covered by a third project. Such classification tests are to be conducted in parallel at three well-known research laboratories after the standard form of test for bond now in process of development by the American Concrete Institute Committee 208 on Bond Stress has been approved.

New Sales Mgr. for Wood

The Wood Mfg. Co., Los Angeles, Calif., manufacturer of the Wood Roadmixer, has announced the appointment of Ray Morse as Sales Manager. Mr. Morse, who is well known among equipment distributors and dealers throughout the southwest, has served for eleven years as Manager of the Los Angeles Wire Rope Department of Wickwire Spencer Steel Co. The appointment coincides with the recent introduction of a new and larger Wood Roadmixer, first units of which have just been completed.



50% of the nation's stand of virgin timber is in Oregon and Washington. Available supplies of structural timber 3 in. and thicker from these forests run from 15 to 20 million bd. ft. each week.

AVAILABILITY IS IMPORTANT

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There is plenty of construction timber. Rumors and statements regarding a shortage of large dimension lumber are unfounded and harmful to those who wish to use structural timber in their projects, to the lumber industry, to timber fabricators who are geared to the efficient speedy delivery of trusses and other heavy items so important in modern construction.

In the interest of straight thinking, here are the facts:

1. From 15 to 20 million bd. ft. of structural timber is available weekly.
2. WPB and the West Coast Lumberman's Association are on record as stating that timber and planks 3 in. and thicker are readily available.
3. WPB's "critical" category relates almost wholly to 1 in. and 2 in. boards of which some 15 billion bd. ft. (many times normal requirements) will be needed this year for boxing and crating.
4. No legitimate construction job need be deferred because of lack of structural timber; the prosecution of such jobs will help to increase production of boards to meet unprecedented demands for crating and boxing.

We repeat: There is no shortage of structural timber. Our Portland, Ore. plant has a fabrication capacity up to 400,000 bd. ft. per day and yearly production exceeding 80 million bd. ft. of prefabricated lumber.

Large lumber storage capacity plus proximity to the forests and mills of the Northwest makes possible the maintenance of sufficient quantities and sizes of material to fill orders promptly. Inquiries are welcomed and given prompt attention. If present or future building plans are under consideration, write for booklet "*Engineering in Wood*" illustrating work we have done, are doing.

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The same power unit furnished in the Blackhawk Bender licks these tough jobs easily.

GET *all* the usefulness out of your Blackhawk Porto-Power Pipe Bender! Sure, it bends pipe up to 4 in. Also, it can be removed from the bending frame to serve as a powerful jack—or with standard attachments to pull, push, spread, press, lift and lower — easily, accurately, safely and fast!

Porto-Power is fast becoming indispensable hydraulic service equipment in maintenance and electrical work, production plants, shipyards, construction companies and repair service organizations.

If you have a Blackhawk Pipe Bender be sure you know *all* its uses. If you'd like to have one, call your industrial supply distributor or write Blackhawk for complete information on Porto-Power in 7, 10, 20 and 50-ton capacities.

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Rush new Hydraulic Equipment Bulletin V-43 to us.

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New Synthetic Rubber For Heavy-Duty Tires

A new type of synthetic rubber, which promises to be especially suitable for use in tires for trucks and similar heavy-duty equipment, has been developed by the Research Department of The Mathieson Alkali Works, 60 E. 42nd St., New York 17, N. Y. This new rubber is said to be strong, tough, and resistant to cuts and abrasion, and its outstanding characteristic is its ability to withstand elevated temperatures.

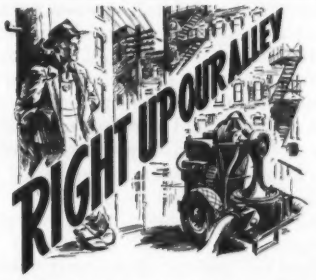
Tires subjected to heavy loads and high speeds become excessively heated in service and wear rapidly if made from rubber that weakens at high temperatures. This has been one of the problems to be overcome in the development of synthetic rubber. Preliminary reports of comparative road tests under the sponsorship of the Office of the Rubber Director indicate that the Mathieson rubber stands up well under severe service conditions, according to G. W. Dolan, President of Mathieson Alkali.

The Mathieson rubber is made of butadiene and a new chemical produced from readily available raw materials, and its cost is expected to be about the same as that for GR-S, formerly known as Buna-S, on the same scale of manufacture. As it is still in the development stage, detailed plans for its production and use cannot be revealed at this time.

Use of Calcium Chloride As Admixture in Concrete

The use of calcium chloride in concrete for faster hardening and greater strength at reduced cost is discussed in two pamphlets available from the Wyandotte Chemicals Corp, Michigan Alkali and J. B. Ford Divisions, Wyandotte, Mich. It is stated that tests at the National Bureau of Standards show that concrete containing calcium chloride develops 300 per cent greater strength in twenty-four hours than plain concrete, even at an air temperature of 40 degrees, and a considerably greater degree of strength at higher temperatures. Several examples are cited where the use of calcium chloride in concrete for paving runways, and in block, pipe, tile and other concrete products has proved advantageous in hastening the completion of vital war projects. Directions for the use of the additive by the dry-flake and solution methods are given, as well as a table of quantities showing the amount of the chloride to be used at given temperatures.

Copies of these pamphlets, and the 64-page Manual on Concreting issued by Wyandotte, may be secured upon application to the company and mention of this item.



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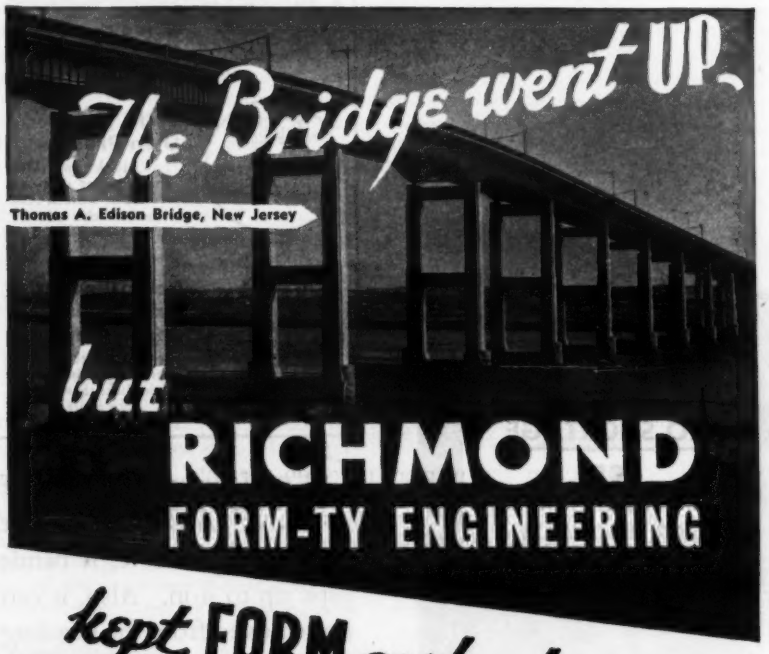
BECAUSE: We didn't have to convert to War Production. Novo's Line of Construction Equipment met Army and Navy Specifications. In fact, it was just what Uncle Sam ordered . . . . and he ordered plenty of it! The same high-quality Novo Engines, Pumps, Hoists, and Generator Sets that you have used for years were ready for war by merely donning a uniform of G.I. paint. Yes, when the enemy struck the Novo Line was ready for the Front Line.

THEREFORE: There will be no idle period of reconversion. Novo Construction Equipment, better for having served in the Armed Forces, will be ready and available to carry on your peacetime business. So, plan your Post War Prosperity on a solid foundation, built on Novo Construction Equipment.

We are currently in production on all items illustrated at the right. While most of our production is reserved for the Armed Forces, we can make limited shipment to Civilians with proper Priority.

Also a member of A.E.D.

NOVO ENGINE COMPANY LANSING, MICHIGAN



kept FORM costs down!

RICHMOND 10-WAY SAVING PLAN

1—Provides all kinds of form-tying devices to choose from.
2—Economizes because Form Ties cost less to use than wire, band or rod ties.
3—Supplies Form Ties engineered for safe working loads of 1,500-30,000 lbs.
4—Assures faster erecting and stripping plus big lumber savings.
5—Promotes perfect alignment for correct wall thickness.
6—Protects job against rust staining with 1 to 3 inch cutback.
7—Saves shipping and handling costs because of scientifically reduced weight.
8—Is only known prevention against termite destruction.
9—Enables you to borrow working parts and to pay only for ties in the job.
10—Is planned from job plans to use the right size of ties and the least number of ties to fit forming for fast, safe work.

SEE OUR CATALOG IN SWEET'S

Whether you are planning, designing or estimating on a concrete job—large or small—there are *Dollars* to be saved on *Form Work* by planning.

Richmond Services to Architects, Engineers and Contractors include recommendations on Form Tying Devices. Consultation on Form problems and Forming used, as well as Estimates on requirements, all without obligation.

The list of big jobs on which Richmond Form Ties have saved on form-work costs and speeded up completion is a blue-ribbon list of modern construction. It includes mammoth projects everywhere—and small contracts, too. There is a Richmond Tie engineered for every type of concrete construction. We plan a Tie to fit the work.

For information, write to our Planning Division.

RICHMOND SCREW ANCHOR COMPANY, INC.
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Established 1911

Twenty-two REASONS
Why *FLEX-PLANE* Dummy Joints are Necessary in Modern Concrete Pavements

- Reduces the Number of Expansion Joints
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- Prevents Cracking
- Retards Creeping
- Controls Warping
- Reduces Curling
- Relieves Stress
- Lessens Bumps
- Minimizes Pumping
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- Lessens Deterioration
- Lowest Cost
- Limits Maintenance Cost
- Anchored in Place—Is Permanent
- No Extrusion
- Localizes Expansion and Contraction
- Assists in Normalizing the Slabs
- Ribbon Joint is Continuous in Length
- Prevents Infiltration of Water
- Increases Strength of Slabs
- Produces Homogenous Structure
- Provides Expansion Relief for the Hot Upper Part of the Slab

FLEX-PLANE joint installing machines eliminate messy hand methods. Install all types of joints . . . ribbon, poured, premoulded, etc., with or without VIBRATION.

• *Ask for Equipment Specifications* •

FLEXIBLE ROAD JOINT MACHINE CO. WARREN, OHIO U S A

Progress in Planning Future Roads in Utah

(*Continued from page 45*)

miles of road, which, when plans are completed, will cost approximately $13,000,000 to construct. A partial program on 382.1 miles of road has also been submitted, the planning for which is being financed by $222,550 from the unexpended regular Federal-Aid, secondary, and grade-crossing funds, which was authorized by Congress, if the state so elected, for use on preliminary engineering work. The expected cost of construction of roads in this program is approximately $17,000,000. A fair portion of this latter program is well under way, with plans complete on approximately $2,000,000 of work. Many of these surveys and partial plans have been completed for several years, but time is being taken to review carefully the location and design, and modernization of the highway, if necessary. It is much easier to change design on the plans than to make the change in the completed roadway a few years hence. This latter program is approximately 50 per cent surveyed, plans are about 13 per cent complete, and on many of the projects nearly 75 per cent complete. Within a few months a fair number of projects should be ready to advertise.

Important things yet to be done in Utah's post-war highway program, besides the study of limited-access highway needs, is the passing of adequate laws to permit such construction, and a joint study of city traffic needs in the larger cities. A further study is required on secondary road needs, especially in recreational areas.

If the State Road Commission is fortunate enough to obtain the services of a few additional trained men, mainly qualified transitmen and levelmen, it is felt that the Department can have an adequate post-war program ready at the close of this year which will utilize all funds which might then be available for construction, based on present pending authorizations, should the war be over at that time.

Financing

With respect to the financing of the construction, Utah expects considerable Federal assistance, as approximately two-thirds of the state is owned by the Federal government, in which many of the most expensive roads are located. It is no more than just that the cost of such roads should be paid entirely with Federal funds. Also, for the benefit of the nation as a whole, in providing a high-type Interregional Highway for inter-state transportation and for use in wartime, the Federal government is justified in assuming a large proportion of this construction; in fact, it is the only way that Utah could consider such a highway system.

There are some who are now suggesting the distribution of Federal-Aid funds more on a population basis. As this affects the Public Lands states, it is entirely unjust. In Utah, with only the revenue developed through its own taxes, it would be impossible to finance such a program through the government-owned land. The mere increase of percentage of matching Federal Aid does not accomplish anything unless sufficient revenues are provided. If all federal and state motor-vehicle taxes were returned to the highway for construction and operation, the program could be financed easily from this fund and the motor-vehicle operator who pays the bill would then, by an adequate system of highways, be more than repaid by reduced operation costs.

By the end of the war Utah should have in reserve nearly enough funds for one year's matching of the proposed national $1,000,000,000 program, and with participation in right-of-way purchases permitted, and a large proportion of the preliminary engineering program completed, the revenue as derived from the motor-vehicle taxes should finance the program.

A large post-war highway program is justified for its economic value to the state and nation, as well as for its value in reducing unemployment during the transition from war to peace. The plans must be carefully prepared in advance to give maximum efficient benefits.

From a paper at the University of Utah Highway Engineering Conference, February 29-March 1, 1944.

New Link-Belt Sales Office

The territory comprising eastern Washington, northern Idaho and a western portion of Montana will be served through a new sales office and warehouse just opened at South 151 Lincoln St., Spokane 8, Ore., by the Link-Belt Co., according to a recent announcement from the Pacific Division. The new office is centrally located, and will carry in stock a representative line of Link-Belt power transmissions, elevating and conveying equipment. H. A. Garland will be in charge.

U. S. Army Signal Corps Photo

Working on a 20-ton all-weather road on New Guinea, a Caterpillar D8 tractor and LeTourneau Carryall pull a motor grader out of the mud.

FOR HEAVY DUTY
LIFTING—LOWERING
PUSHING—PULLING
DUFF-NORTON JACKS

When there's work to be done, Duff-Norton Jacks do the job! They're tough and husky—built to give you power, speed and ease of handling every time. And the Duff-Norton Jacks you buy for today's war-time construction work, will still be giving the same dependable, efficient service in the peacetime years to come.

Catalog 202 gives you complete details!

DUFF-NORTON JACKS are "mechanical muscles" for every job.

THE DUFF-NORTON MANUFACTURING CO.
PITTSBURGH, PENNSYLVANIA
Canadian Plant: COATICOOK, QUEBEC
Representatives in Principal Cities

MAINTENANCE COSTS HELP DECIDE PAVING JOB PROFITS!

The maintenance cost per yard of concrete produced is an important consideration in the ultimate cost and paving job profit. Construction machinery should be selected for its ability to "take it" and then come back for more. Ransome Pavers are provided with ample strength and top quality from crawler pad to water tank . . . from boom tip to skip end.

The result of many years of constant improvement, today's Ransome is at work on 'round-the-clock war jobs and ready for the post-war future. Consider a Ransome for your next paving job. We will be glad to supply more reasons why.

CONSTRUCTION EQUIPMENT DIVISION Ransome MACHINERY COMPANY
DUNELLEN, NEW JERSEY
SUBSIDIARY OF WORTHINGTON PUMP AND MACHINERY CORPORATION

Wartime Conference On Wood Preserving

Various phases of the use of treated wood were discussed at the second wartime conference of the American Wood Preservers' Association held in Chicago in April. Flameproofing of both timbers and plywood accounted for more report subjects than any other phase of wood treating considered at the meeting, including reports from the Navy, the largest wartime user of flameproofed wood, in its giant blimp hangars. Rounding out the session on flameproofing, L. F. Linthicum, President of the American Lumber & Treating Co., Paul Wayman, its General Superintendent, and its Technical Director F. W. Gottschalk presented a three-man report on the company's experience in flameproofing more than 37,000,000 board-feet of lumber for war uses.

Representing one of the high-priority users of treated wood, H. M. Church, General Supervisor of Bridges and Buildings, Chesapeake & Ohio Railroad, commented on treatment practices of the railroad. Mr. Church said that the C & O had found creosoted wood the most suitable decay and insect-protected material where painting, surface cleanliness, odor and fire hazards are not important considerations. He added that where such factors are important, salt-treated and fireproofed timbers are used by the railroads, especially in tunnel lining, bridge decking, and fire breaks.

Post-war uses for treated wood were discussed by Verne Ketchum, Chief Engineer for Timber Structures, Inc. Touching particularly on the use of timber in bridge construction and in public utilities, Ketchum predicted heavy post-war needs for wood construction in both these fields. In speaking of county highways, Mr. Ketchum noted that even though Federal money may be available to supplement county funds, it is still likely that the money would have to be spread pretty thin to cover all repairs that are now needed. In this situation, he foresees a strong probability of post-war use of timber for highway structures.

A number of problems growing out of the war were studied at the convention, one of which is the need for marine piling for the development of captured islands and bases in the Pacific. Marine piling is generally pressure-creosoted, and coal-tar creosote is still plentiful, but the problem is one of treating space. Salts are being used in large quantities, especially the fire-retardant chemicals.

Good lubricants properly selected and used regularly will keep your construction and maintenance equipment working for the duration.

Rough and Ready

DEMANDS READY AND RAPID SERVICE

This photograph shows one of the island clearing projects above the dam at Clarksville, Missouri. 740 acres to clear before water storage from the completed dam covers the island!

Jobs like this one call for dependable equipment, careful planning. But this is not all. Lengthy delays for service must be avoided.

When track repairs are required, Rodgers Track Presses mean hours instead of days to do the job. Rodgers Presses are tested and proved, recommended by *every* manufacturer of crawler type tractors. And these presses are available *now* for essential construction.

If it's a Rodgers, it's the best in hydraulics. Rodgers Hydraulic Inc., St. Louis Park, Minneapolis 16, Minnesota.

HYDRAULICS Rodgers KEEP THE WORLD MOVING

Manufacturers of:

UNIVERSAL HYDRAULIC PRESSES
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HYDRAULIC PLASTIC PRESSES
PORTABLE STRAIGHTENER FOR PIPE AND KELLYS

Where power is needed for pressing, pulling and lifting, write for information about the Rodgers Universal Presses. Both portable and stationary models with varying capacities.

Rodgers HYDRAULIC Inc.

● Cutting big forms for concrete makes duplicate sawing by SPEEDMATIC the efficient method. Available sizes 7½", 8", 10¼" and 12" blades.

Speedmatic PORTABLE ELECTRIC HANDSAW

Construction jobs planned so that a portable saw is kept constantly at work have served to show the superiority of SPEEDMATIC—the saw specifically designed to do hour-after-hour sawing of heavy pieces—with less fatigue to the operator, and cleaner, better work.

SPEEDMATIC'S efficient helical gear delivers 11% more power to the blade. The blade enters the cut at 7,000 revolutions per minute—all the power you'll ever need for fast, effortless cutting—no twisting or stalling.

Only SPEEDMATIC has the extra wide base that sets the saw securely and safely, even when tilted at a 45° angle. Perfect balance allows one-hand operation in any position. Sturdy, compact housing assures long life.

Why be content with anything else when this top-quality saw will prove cheapest in the long run? See your Porter-Cable dealer (his name is in the classified 'phone book) or write us for further details.

PORTER-CABLE MACHINE COMPANY
1805-6 N. Salina St., Syracuse 8, N. Y.

HOTEL WISCONSIN

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Owned, Operated by MILWAUKEE HOTEL WISCONSIN CO.
LEWIS S. THOMAS Manager

With Bath $2.75
Without Bath $1.65

Rural-Road Planning Calls for Cooperation

(*Continued from page 48*)

well as all of the other rural roads of low volume, is woven into the selection of a future third increment of tertiary roads.

Planning for Rural Roads

This will call for cooperation in local highway planning by the Department of Agriculture, the Public Roads Administration, and the state highway departments. This cooperation involves an intimate coordination of the highway planning surveys of the Public Roads Administration and state highway departments with land-use considerations of the Department of Agriculture. It provides a unique opportunity for highway officials to join with agricultural experts and local groups in planning not only the improvement of local roads to conform with agricultural plans for the best use of the land, but also to discover and agree upon the roads which should not be improved and which should in fact be abandoned because as a continued public responsibility they impose an impossible financial burden and promote the continued use of submarginal lands.

An example of the results attainable with this type of planning is furnished by the selection and establishment of a Federal-Aid secondary system in Colorado where the state highway department was particularly active and interested in cooperating with the land-use planning groups and the local governmental agencies responsible for local roads. This planning went beyond the selection of a secondary system, as it should, to the selection of feasible county systems and to the formulation of general plans for their suitable improvement within the financial means of the counties. It resulted in the recognition by the local citizens themselves and their elected officers that relatively large mileages of local roads were an impossible financial liability, and there developed a surprising willingness to abandon such roads as a public responsibility. In Delta County, Colorado, for example, this planning operation accomplished not only complete agreement upon an intelligent state and Federal-Aid system and a Federal-Aid secondary system, but reduced the county road system mileage by 36 per cent. Previously the county had been attempting to service some 800 miles of road with a road and bridge fund of approximately $115,000, or an average of about $140 per mile. Another county in Colorado was responsible for 3,200 miles of local rural roads. A similar attack on the problem resulted in the closure of nearly a thousand miles without seriously affecting a single farmer or rancher, and the reversion of 1,200 miles to private ownership, a total reduction of county mileage of nearly 70 per cent.

In one of the midwestern states, which enjoys perhaps the nearest approach to a uniformly distributed and highly developed agriculture, one would suppose that the total improvement of the typical midwestern gridiron of rural roads would be justified, if anywhere. It is reported, however, that a recent study shows it is reasonable to abandon nearly one-fifth of the rural mileage and still serve directly with the remaining mileage every farm in the state.

The foregoing analysis presents rather conclusively the effectiveness of the combined Federal-Aid primary and secondary system of roads. The combination represents the "work horse" of our rural highway transportation system. It encompasses most of the roads that can be made a part of a national network, and is a system that can be administered jointly through the states and the Public Roads Administration, and improved by the states, economically and efficiently, employing standard methods of initiation and construction applicable to the individual projects.

From a paper presented at the 41st Annual Meeting of the American Road Builders' Association in Chicago, Ill., Feb. 1-3, 1944.

★ Cargo Conveyors for Industrial Use
★ Troughing Conveyors for Loose Materials
★ "Coal Special" Type
★ "Motomove" Self-Propelled Conveyors

FOR WAR-TIME LABOR SAVING

Flexible... Adaptable... Relatively Inexpensive... Conveyors as Haiss builds them are the logical answer where man-shortages make each workman's labor precious.... Haiss Portable Conveyors are *engineered* jobs, with loads carried on high-grade ball and roller bearings. Frames are truss-designed for strength without excess weight.

Essential Industry Inquiries and Orders given prompt attention. Write us.

GEORGE HAISS MANUFACTURING CO., INC., Canal Place and E. 142nd St., New York 51, N. Y.

MAINTENANCE WITH BITUVIA Road Tar

PROTECTS YOUR HIGHWAY INVESTMENT

A copy of this pocket-size BITUVIA *Manual will be sent on request*

● Neglected roads, long overdue for repairs, must receive attention during 1944 if highway investments are to be protected and essential traffic kept moving at the speed demanded by war.

BITUVIA Road Tar is particularly adapted for wartime maintenence work because it requires a minimum of equipment and man hours per mile. Other outstanding advantages of BITUVIA are its deep penetrating and firm binding qualities.

A Reilly engineer will be glad to show you how BITUVIA can be used—quickly and economically—on practically all types of maintenance and repair work.

PLASTUVIA CRACK FILLER

PLASTUVIA binds firmly with concrete and brick, and thoroughly waterproofs cracks. Does not break or chip in winter, nor "pick" in summer. Reduces crack filling costs to a new minimum.

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SEVENTEEN · PLANTS · TO · SERVE · YOU

ROLLING RUNWAYS TO TOKYO!!

Vital to every advance on the road to Tokyo are the airfields with their runways made carpet-smooth with American equipment.

Prominent in the preparation of these runways are Buffalo Springfield rollers . . . the same rollers that will again serve in peacetime.

BUFFALO SPRINGFIELD ROLLERS

THE BUFFALO SPRINGFIELD ROLLER COMPANY

SPRINGFIELD, OHIO, U. S. A.

Another New Service Performed by Bulldozer

Before the war, the sturdy yet humble bulldozer performed many recognized services on a wide variety of road-building and dirt-moving jobs. It was inevitable that it would perform similar services with our fighting forces. But since our troops have gone into action, stories come back regularly of new and unusual performances by this familiar piece of construction equipment, including its use as a tank in wiping out Jap machine gun nests.

Another new application is described in a recent issue of *Time* Magazine in an account of the capture of two criminals in Nigeria, British Africa. According to this story, a village chief was giving shelter to two natives wanted on criminal charges. Around his village the chief built a "Maginot Line" of thornbush to keep out the authorities who wished to arrest the wanted men. A bulldozer was transported by lorry to a nearby point and then unloaded for battle under the command of a Cockney driver. The task of this "land force" was to break down the thornbush. For the first time on record, a bulldozer went into action with fighter cover, as a single RAF plane was also assigned to the action, to assure Tommy air cover in case of any resistance during operations. As the bulldozer advanced, the fighter dived on the village, firing a succession of Very lights. Resistance collapsed; the "enemy" surrendered; the operations were concluded; and the wanted men were taken into custody.

Later in the day, an appropriate communique was issued by the RAF station commander to the effect that our mechanized forces withdrew after achieving their objective and "from these operations all our aircraft returned safely".

Portable Compressor Unit in Compact Form

The Schramm Model 20 air compressor, available with skid mounting, on low wheels for shop use, or in the two-wheel trailer type for construction jobs, is described in Bulletin 4320 recently issued by Schramm, Inc., West Chester, Pa. One of the illustrations in the bulletin shows the trailer-type unit equipped with a small sandblast outfit for bridge cleaning, or preparing for paint spraying.

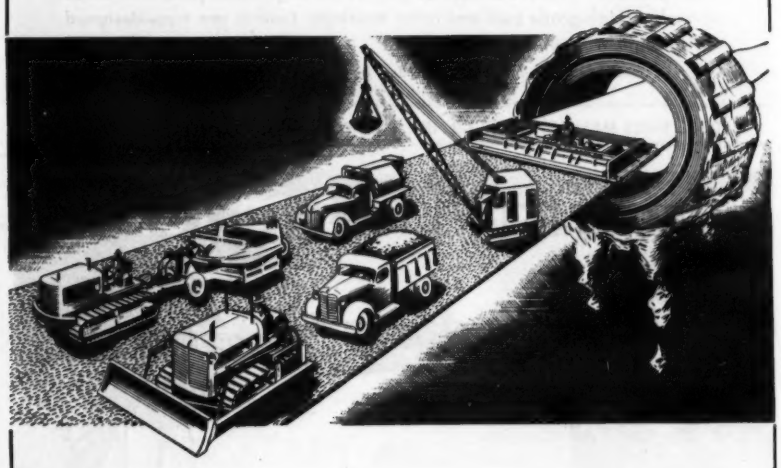
Copies of this bulletin may be secured by interested contractors and state and county highway engineers direct from the manufacturer. Just mention this item.

Unusual Cooperation Builds Needed Highway

How private industry, land owners, county supervisors and the state and Federal government coperated in constructing a much-needed mountain highway in California, with a resulting increase of 8,000,000 board-feet of lumber for the war effort, is reported in a recent issue of the *Highway Highlights*. Of the $356,000 required for this project, $300,000 came from the Federal Government, $40,000 from the California Division of Highways, and $16,000 from three lumber companies. Property owners donated the land required for rights-of-way.

Beginning at the railhead at Martell, Calif., an elevation of 1,500 feet, and terminating at Cook's station, at an elevation of 5,000 feet, where private logging roads join with the state highway, twenty-nine miles of county and state highway were widened, straightened and surfaced, to provide a satisfactory road for the transportation of lumber from the nearby mills. A certain amount of improvement had already been made on a portion of the county road by the county and logging companies, but this proved inadequate. With the construction of the new highway, the mills are now able to operate on a year-round schedule, whereas under previous conditions only 180 days a year were possible, with complete suspension of activities during the winter months.

GREASE
Builds the Highways



● Without lubrication the finest machines in the world would never operate. Without a life-stream of grease they would lie idle. Our vast network of highways would not exist were it not for the well-oiled, smooth functioning of construction equipment. In actual fact it is grease that builds the highways.

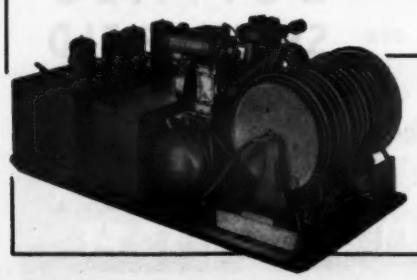
Graco Convoy Lubers

Of no less importance than the lube itself is the method of application—for you've got to get the right grease, in the right place, in the right way. And to do this calls for the correct pressure, for it is just as vital that old dirt and grit laden grease be driven out as to put new grease in.

Graco Convoy Lubers are the answer to on-the-job need for high pressure lubrication. They are complete, self-contained units. Readily portable, they bring highly efficient service facilities to your equipment in the field.

The speed-up made possible by these Graco Convoy field servicing units results in substantial savings in manpower and time—and the lube job you've given your equipment is sure insurance that it will give a longer life of efficient performance. Write for Catalog 146.

GRAY COMPANY, INC., MINNEAPOLIS, MINN.



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CONVOY LUBERS

HAFTRAKS • TRAKTRAILERS
LINN
CONTOUR-FOLLOWING TRACTION

are carrying loads in all climes where off-the-highway operation is required.

● Ruggedly constructed and amply powered for the toughest going.

● **From 5 to 20 tons capacity.**

THE LINN MANUFACTURING CORPORATION
MORRIS, NEW YORK

STRAYER PORTABLE CONCRETE PLANTS

20 to 40 YARDS PER HR.

Make 20 to 40 yards of specification concrete per hour on the job. One-man operation and a helper to handle cement bags. One hour to set up. Move from job to job. Write for booklet today.

ERIE STEEL CONSTRUCTION CO.
ERIE, PENNSYLVANIA
Aggre Meters • Buckets • Concrete Plants • Traveling Cranes

Road Needs in Texas In the Years to Come

(*Continued from page 63*)

roads carrying sufficient traffic to justify their inclusion in a state farm-to-market road system. This study took into account the productivity of the various soils and the fact that approximately 40 per cent of the people of Texas earn their livelihood from the soil. As a result of this study, the Highway Department initiated the development of such a local service-road system, and has now completed and has under maintenance 776 miles of this type of road. To provide a reasonable farm-to-market road system by developing 20,000 miles of this type of road, at an average cost of $8,000 a mile, would total $16,000,000.

Plans for the Future

In spite of the reduction of revenue during the war period, the Texas Highway Commission has been saving its money to be ready for the post-war period. Up to the present time $25,000,000 has been invested in short-term War Bonds as a nucleus for the start of a post-war highway program. Plans and specifications based on major road needs are being developed, to be ready for the post-war era. Already plans for approximately $26,000,000 of work have been prepared, and it could be placed under way on short notice.

The Texas Highway Department has had no political disturbance for seventeen years. The average tenure of office of the heads of the various engineering sections is twenty-two years. Texas has the money, the ability and the road needs, and is anticipating that, with Federal assistance, its post-war road program will make Texas a greater state and will in turn benefit the entire country.

New Booklet Clarifies Status of Rope Orders

The importance of rope in the war effort, a question-and-answer analysis of the WPB's Preference Order M-84 on cordage fiber, cordage yarn and cordage, and a complete reprint of the WPB Order as amended December 6, 1943, are included in War Emergency Service Book No. 4, issued by the Plymouth Cordage Co., North Plymouth, Mass. The amendment to the WPB Order, it is explained, now enables the rope manufacturer to make a delivery promise on certain types of non-military orders with a reasonable chance of meeting it, although continued rope conservation is urged. The book also contains a discussion of the present fiber-supply situation.

Interested rope users may secure copies of War Emergency Service Book No. 4 upon written application to the manufacturer and reference to this item.

ANTHONY LIFT GATE HYDRAULIC

"A LABOR SAVER"
"TAKES PLACE OF EXTRA MAN"
"HAS MORE THAN PAID FOR ITSELF"
"DAMAGE CLAIMS PRACTICALLY NIL"

CAPACITIES 1000 LBS. TO 1500 LBS.

MOUNTS ON TRUCKS NOW IN SERVICE OR ON NEW TRUCKS

ONE MAN now does the work of THREE

- "We can recommend this Loader to anyone, as they certainly are not only a labor saver, but they also protect the steel drums which are very hard to secure. We are ordering another."—The R. J. Brown Co., St. Louis, Mo.
- "The Lift Gate has definitely taken the place of an extra man; if we could not buy another we would not part with our present one for many times what we paid for it."—Continental Oil Co., Louisville, Ky.
- "Our merchandise damage claims have been practically nil."—M. F. Rockey, Moving, Storage, Packing & Shipping, New Cumberland, Pa.
- "Best possible testimonial—ordering two more next week."—Springfield, Ill.
- "This equipment has more than paid for itself since purchased, and we recommend the installation of such equipment on all trucks where loads of 150 lbs. or over are handled."—Bakelite Corporation, Bloomfield, N. Y.

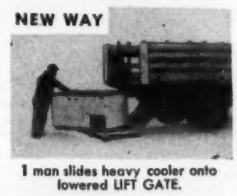
A PARTIAL LIST OF OTHER USERS

Socony Vacuum, Coca Cola, Standard Oil, E. I. DuPont deNemours, and a list of other users, like the Union Pacific Railroad, are enthusiastic operators of the Lift Gate Loader.

OLD WAY

3 men required to load truck.

NEW WAY



1 man slides heavy cooler onto lowered LIFT GATE.

1 man operates lever to raise 3 heavy oil drums.

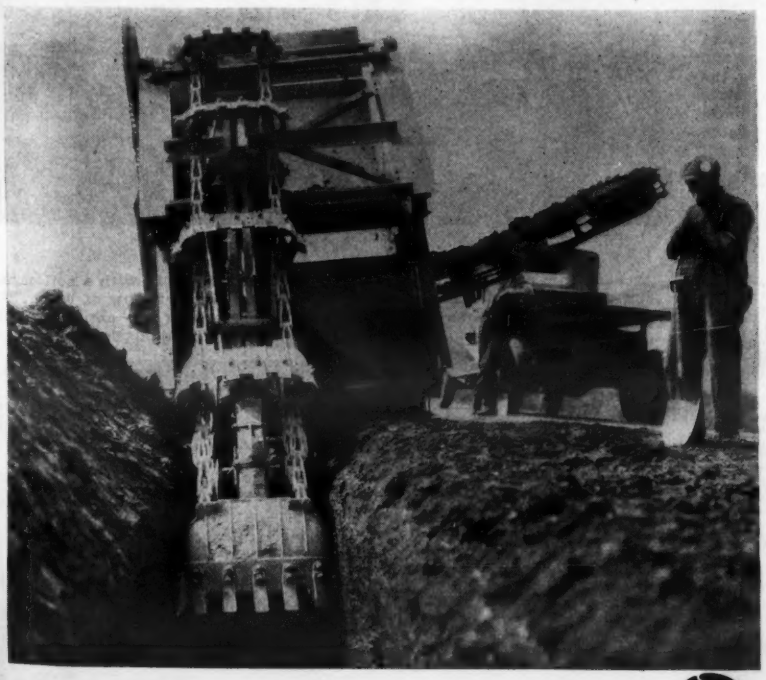
1 man easily loads barrels from raised LIFT GATE.

ANTHONY'S ZB PLATFORM HOIST—Makes Inexpensive dump body out of platform, stake or grain body.

ANTHONY COMPANY, INC.
STREATOR, ILLINOIS

The low price will surprise you. Write or wire for complete information—address Dept. D-21.

OFFSET BOOM TRENCHING *Saves Time!*

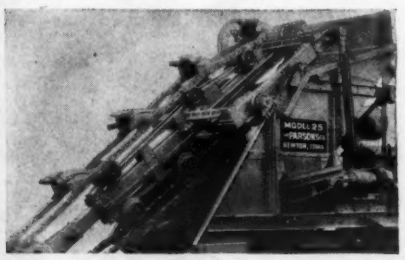


Avoid costly hand excavation on difficult trenching by using a Parsons Trencher.

The offset boom, standard on Parsons Trenchers, makes it easy to dig close to steep banks, near trees or poles and next to curbing. The trench may be cut on line with the outside edge of either crawler just as efficiently as with the boom in center position.

It takes but a few minutes to shift the boom to any position across the width of chute. The shift is positive through its rack and pinion mechanism and the boom is held solidly with heavy bolts through boom and carriage frame.

This is only one of the superior Parsons features.



TRENCHING EQUIPMENT PARSONS

THE PARSONS COMPANY
NEWTON, IOWA

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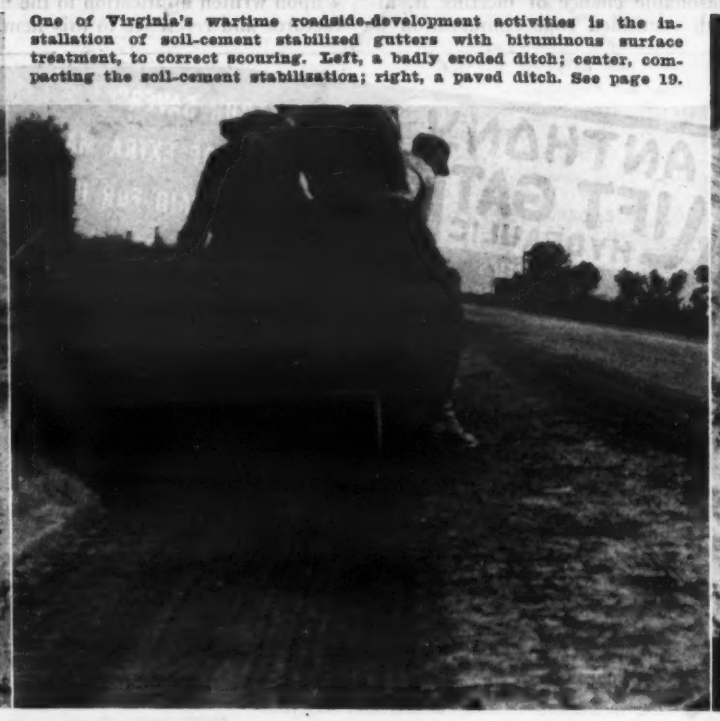
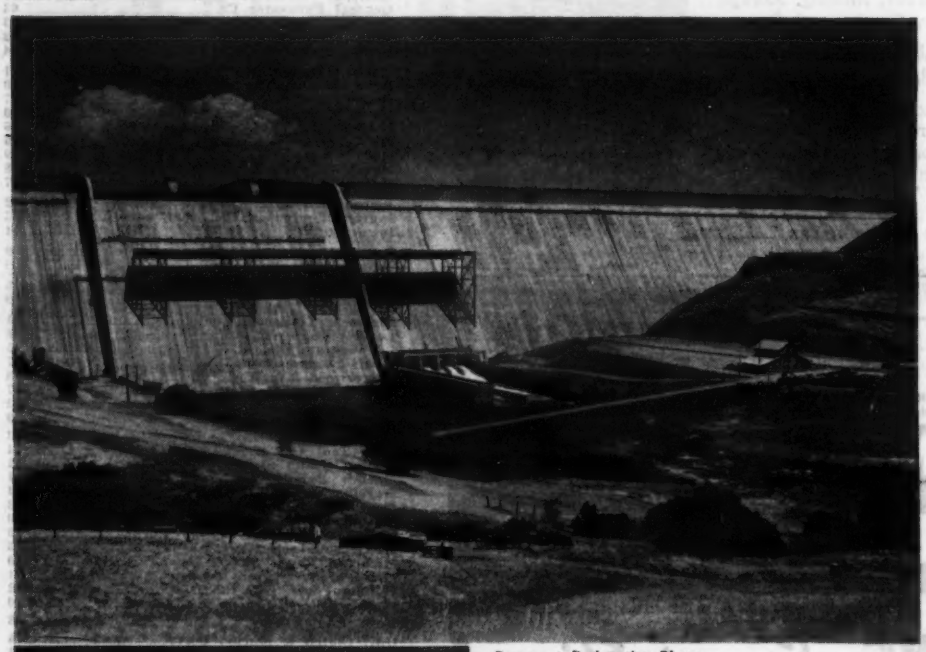
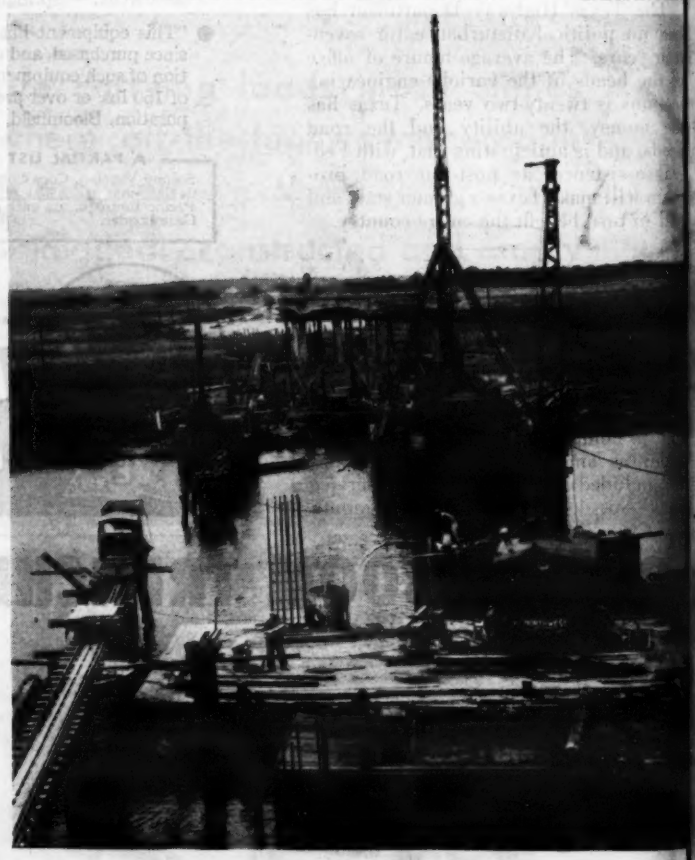


One of Virginia's wartime roadside-development activities is the installation of soil-cement stabilized gutters with bituminous surface treatment, to correct scouring. Left, a badly eroded ditch; center, compacting the soil-cement stabilization; right, a paved ditch. See page 19.

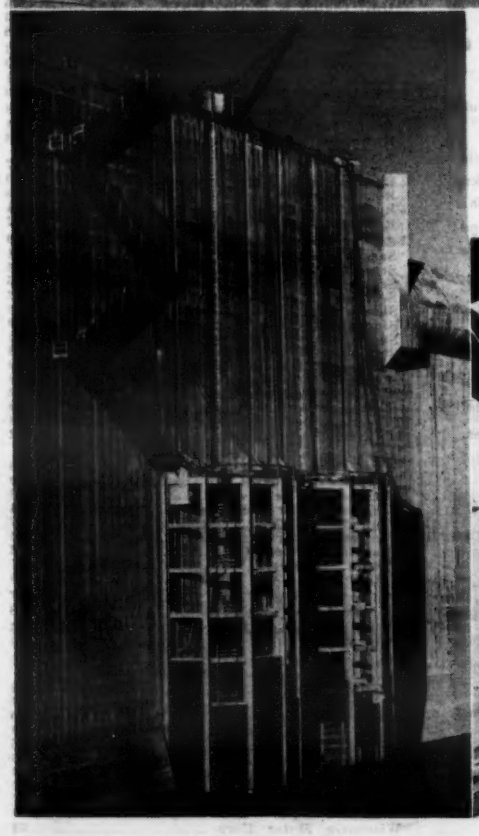


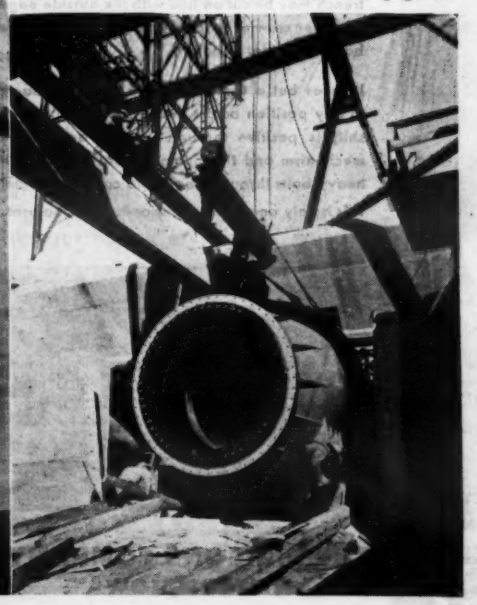
Looking south at the new high-level concrete and steel bridge over the Dari[en] River on U. S. 17 in Georgia during maximum construction activity. Th[e] 6-year-old detour bridge is seen at the right. See page 1. *C. & E. M. Pho[to]*



Bureau of Reclamation Photos

Above, a general view of the downstream face of Friant Dam on the San Joaquin River near Fresno, Calif., showing the discharge through four river outlets. Left, the upstream face of the dam, showing the trash-rack structures and hanging stairway used by workmen during the installation of the gate guides. Note the slots in the walls left for installing the guides. Below, placing a section of 84-inch needle valve in a river outlet at Friant Dam. See page 37.





A check dam of adequately compacted local clay and soil, with a soil-ceme[nt] spillway, serves with minimum erosion under a constant flow of water. Th[e] erosion at the extreme right is due to water topping the entire dam an[d] failure to carry the soil-cement spillway high enough. See page 29.